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ABSTRACT

The Subcommittee on Early Childhood, Youth and Families, Committee on Education and the Workforce, Washington, DC met in Washington, DC on March 8, 2000 to hear testimony on the role of technology in America's schools. Chairman of the Subcommittee Michael Castle presided. Contents include the opening statements of Chairman Michael Castle and of ranking member Dale Kildee and statements of: Carlene Ellis, Vice President for Education, Intel Corporation, Folsom, California; Tony Lee, Senior Director, Worldwide Markets, Apple Computer, Inc., Cupertino, California; Jason Bertsch, Deputy Director of Policy, Empower America, Washington, DC; David H. Winston, Senior Vice President, Fabrizio, McLaughlin & Associates, Alexandria, Virgina; and Jeffrey Chin, Computer Literacy Teacher, Elliott Alternative Education Center, Modesto, California, on behalf of the National Education Association. Appendixes include the written statements of Chairman Michael Castle, Ranking Member Dale Kildee, Carlene Ellis, Tony Lee, Jason Bertsch, and David H. Winston. (Includes a table of indexes.) (AEF)

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THE ROLE OF TECHNOLOGY IN AMERICA'S SCHOOLS

ED 465 374

HEARING

BEFORE THE

SUBCOMMITTEE ON EARLY CHILDHOOD, YOUTH AND FAMILIES

OF THE

COMMITTEE ON EDUCATION AND THE WORKFORCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTH CONGRESS

SECOND SESSION

HEARING HELD IN WASHINGTON, DC, MARCH 8, 2000

Serial No. 106–94

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THE ROLE OF TECHNOLOGY IN AMERICA'S SCHOOLS

Wednesday, March 8, 2000

House of Representatives,
Subcommittee on Early Childhood, Youth and Families,
Committee on Education and the Workforce,
Washington, D.C.

The subcommittee met, pursuant to call, at 1:09 p.m., in Room 2175 Rayburn House Office Building, Hon. Michale N. Castle presiding.

Present: Representatives Castle, Petri, Hilleary, Isakson, Kildee, and Wu.

Staff Present: Linda Castleman, Office Manager; Cindy Herrle, Professional Staff Member; Dan Lara, Press Secretary; Patrick Lyden, Professional Staff Member; D'Arcy Philps, Professional Staff Member; Michael Reynard, Media Assistant; Kevin Talley, Staff Director; Bailey Wood, Legislative Assistant; June Harris, Education Coordinator; Alex Nock, Legislative Associate/Education; and Roxana Folescu, Staff Assistant/Education.

Mr. Castle. A quorum being present, the Subcommittee on Early Childhood, Youth and Families will come to order. We are holding this hearing today to hear testimony on the role of technology in America's schools. Under Committee Rule 12(b), opening statements are limited to the Chairman and the ranking minority member, Mr. Kildee of the Subcommittee. This allows us to hear from our witnesses sooner and to help members keep to their schedules.

Let me just tell you about one scheduling problem right now. There is going to be votes at 2 o'clock. So, we will have to interrupt it at that point.

If other members have statements they are certainly welcome to submit them in writing. And with that, I ask unanimous consent for the hearing record to remain open for 14 days to allow members' statements and other documents referenced during the hearing to be submitted in the official hearing record. And without objection, that is so ordered.

OPENING STATEMENT OF MR. MICHAEL N. CASTLE, CHAIRMAN SUBCOMMITTEE ON EARLY CHILDHOOD, YOUTH AND FAMILIES, EDUCATION AND THE WORKFORCE COMMITTEE,

REPRESENTATIVE FROM THE STATE OF DELAWARE.

I would like to take this opportunity to formally extend a welcome to today's hearing to everybody here in the room on an issue that is of not only importance to all of us but of increasingly and dramatically growing importance to all of us: The use of technology to expand and improve educational opportunities for our children.

Over the past year, this Subcommittee has held several hearings on this important topic. And we have heard witnesses describe innovative State and local efforts to integrate technology into the classroom. In one such instance, the Capitol School district, in my State of Delaware has partnered with industry and used Federal Technology Innovation challenge grants to provide students with the technology to extend learning beyond the traditional school day and help parents stay involved in their child's education.

More importantly, as determined by the University of Delaware, participating students significantly improved their scores on the Stanford 9 achievement tests in both reading and math by 24 and 16.1 percentile points respectively.

Today, we will focus more specifically on the role that industry can and must play if we are to be successful in helping all schools gain access to technology and use it to raise student achievement. We will also examine other issues related to education technology, including the best way to protect children and schools from inappropriate material on the Internet, through Title III of the Elementary and Secondary Education Act, the program which houses the majority of Federal education technology programs. I think we can all agree we have made great strides in helping schools obtain computers and connecting them to the Internet. But we can also agree that we need to do more than simply place the computer in the classroom.

A recent survey released by ``Education Week" shows that training plays a critical role in how teachers use educational software and websites or digital content. Teachers who have more technology training are more likely to use digital content in their classrooms, are better prepared to use it, and rely on it more heavily than teachers with less training. For these reasons, we must help our teachers appreciate the benefits of education technology and teach them to integrate it into their lesson plans.

We must also abandon traditional professional development programs which, typically involve a day or two of in-service training, in favor of programs that deliver high quality, ongoing opportunities for training in education technology. The ``Education Week" survey also shows that teachers struggle to find high quality software and websites to use for their classes and many are overwhelmed by the literally hundreds of thousands of products that are offered in this ever-expanding market. We must help our educators to identify the programs and products that best suit their needs.

Finally, to make sure these investments in computers, professional development and digital content pay off, we must ensure that our schools have the tools to evaluate the success or failure of their efforts in the area where it matters most: The academic improvement of their students.

Given our efforts to reauthorize the Title III programs in the coming weeks, this discussion is especially timely and it is my hope that we can draw from today's hearing to strengthen our Federal programs and make education technology a reality for all children.

Again, I thank you for your attendance today, particularly the witnesses who have taken the time to prepare and to be here. I will now yield to the ranking member, Mr. Kildee, for any opening statement that he may wish to make.

See Appendix A for the written statement of Mr. Michael N. Castle, Chairman, Subcommittee on Early Childhood, Youth and Families, Education and the Workforce Committee, Representative from the state of Delaware.

Mr. Kildee. Thank you, Mr. Chairman.

OPENING STATEMENT OF MR. DALE E. KILDEE, RANKING MEMBE, SUBCOMMITTEE OF EARLY CHILDHOOD, YOUTH AND FAMILIES, REPRESENTATIVE FROM THE STATE OF MICHIGAN.

I want to join you in thanking the witnesses here today. Both of us are looking forward to your testimony. Technology in our classrooms and increasing its access to disadvantaged children is an essential component in raising the educational achievement of our nation's students. Most States and school districts, with help from both the public and private sectors, have made good efforts to increase access to technology, especially emerging technologies. Unfortunately, the digital divide or the separation between the technology haves and the technology have-nots still continue to plague our nation. As a matter of fact, they plague my own congressional district.

I have schools in my district that are the latest state-of-the-art in everything including technology and I have other school districts where it is tough to get a telephone line spread to another classroom. It is just extremes within the same congressional district.

So, clearly one of our priorities in the reauthorization of Title III must be to help with the effort to close the digital divide.

No better example of technology's impact on student achievement is evidenced by last year's long-term study of West Virginia's basic skills computer education program which you will hear about today. This study showed that technology was an important factor in helping students make significant gains in basic educational skills. More importantly, the study found that West Virginia's technology program made its biggest impact on the neediest children and rural children without computers at home.

These disadvantaged children showed the largest gains in student achievement and the study found that the educational technology resources provided in the schools was a major factor in accomplishing this.

In our efforts to evaluate current Federal technology initiatives we should not lose sight of the fact that simply placing technology in our classrooms is not enough. Both our new teachers and our veteran teachers must have the knowledge and skills to integrate technology into every day instruction and teaching. Pre-service training and professional development in this area is critical to technology having a positive impact on student achievement. This is certainly evidenced in West Virginia.

Lastly, I believe we need to take a critical look at our existing Title III programs. However, in this critical examination we should not back away from targeting technology funding for disadvantaged students. It is too important that we work to close, Mr. Chairman, not to exacerbate that digital divide.

And, again, I thank you very much for arranging for this hearing today.

See Appendix B for the written statement of Mr. Dale E. Kildee, Ranking Member, Subcommittee of Early Childhood, Youth and Families, Representative from the state of Michigan.

Mr. Castle. Thank you, Mr. Kildee. We appreciate your statement and interest in this as always.

Let me try to explain the process for a moment. I am going to turn to Congressman Wu to introduce, I believe, Carlene Ellis. But before we get to that, as you probably know but I just want to reiterate it, you each will have five minutes in which to speak. You have before you little lights that sometimes work, sometimes don't work. Hopefully they will work today. It will be green for four minutes, yellow for one minute and red. Nothing too dramatic happens when it becomes red except that we hope at that point you are thinking about closing as rapidly as you can.

Your statements will all be part of the record. You don't have to worry about requesting that or whether they will be or not, they will be. And that is not insignificant because it becomes part of the record and the staff gets it and everyone analyzes it and that kind of thing. And you are welcome to proceed as you choose. You can read from your statement or you can speak independently of it or whatever it may be, as long as you can do it within five minutes.

We will go in order. We will start with Ms. Ellis and after Mr. Wu introduces her I will introduce the other witnesses and we will go right down the line, and then when you are all done the members who are here or who come in during the time of questioning may each also take five minutes and that is the question and answer period. And I will alert you that we try to get as many questions as we can so, you know, if we are going to get Q&A into five minutes, we need to have relatively brief answers here.

So, I hope you all understood that to be the format before and it works out well from your point of view. And with that, let me turn to the distinguished Congressman, Mr. Wu.

Mr. Wu. Thank you, Mr. Chairman.

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Mr. Kildee, members of the Committee, I would like to introduce Carlene Ellis, Corporate Vice President for Worldwide Education at Intel Corporation. And Intel is the leading private sector employer in the State of Oregon and, indeed, there are more Intel employees, I believe, in the State of Oregon than in any other State and Carlene is a leader at Intel.

After graduating with a mathematics degree from the University of Georgia and doing postgraduate work at several other institutions, she started out at Fairchild Cameron Instruments, one of the mother ships of modern American technology and then moved on to Intel, rising through the ranks of sales and human resources. And after spending 19 years at Intel, we all know that Carlene stays there as a labor of love, rather than having to work.

And the work that she does do at Intel is something that I think we can all love because Intel has been a leader in public/private partnerships and in putting technology into the classroom in our State. But Intel does not just dump a computer on the desk top in schools, Intel donates parts and encourages students to learn to put computers together, to refurbish them, and at the back end, after the computer is on the desk Intel is now working through the Teacher to the Future program to incorporate technology comprehensively into curricula across the country and innovating in public/private partnerships in our State and elsewhere throughout the Northwest.

Carlene, welcome to Washington and we look forward to your testimony.

Mr. Castle. Thank you, Congressman Wu.

I will go through the others first and then we will get back to your testimony.

The others will be a little briefer. Mr. Tony Lee is the Senior Director of Worldwide Markets for Apple Computers, Inc., as you can see by the instrument in front of him. Mr. Lee is responsible for education and creative professional and consumer solutions marketing. For the past ten years he has held various positions at Apple, including business development, new product development, as well as being involved with Apple's United Kingdom Offices.

Mr. Jason Bertsch is Director of Policy for Empower America. He focuses energies on research, publications and lobbying efforts in the areas of education reform and technology issues. Prior to Empower America, he was managing editor of the publication, "The Public Interest" and was also an aide to Senator Sam Nunn as well as short stint with Congressional Quarterly.

Mr. David H. Winston is Senior Vice President with Fabrizio, McLaughlin & Associates, FMA, in Alexandria, Virginia. At FMA he is responsible for international strategic consulting and marketing research. Prior to his current position he was Director of Planning for former House Speaker Newt Gingrich. Recently he was named to the Federal Web-Based Education Commission. Mr. Winston has also held positions with the Heritage Foundation, the Republican National Committee, and the National Republican Congressional and Senatorial Committees.

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And, Mr. David Chin is a Computer Literacy Teacher with Elliott Alternative Education Center in Modesto, California. For the past 19 years, Mr. Chin, has been a classroom teacher as well as being active with his local and State teacher organizations. Being a classroom teacher, you are more important than all of us and everybody else out there. We appreciate all that our teachers do in America.

And with that, we go back to the beginning and we start with Carlene Ellis. We welcome you here and look forward to your testimony.

STATEMENT OF CARLENE ELLIS, VICE PRESIDENT FOR EDUCATION, INTEL CORPORATION, FOLSOM, CALIFORNIA

Ms. Ellis. Well, thank you. I am glad to be here this afternoon. David, thank you, for that most generous introduction. It is a labor of love.

Mr. Chairman, Mr. Kildee and members of the Committee, Intel is deeply vested in education and education reform. I am not going to go straight off the text we gave you. You can read it. It is very illustrative of our efforts.

But what I want to do is take it from the top why we, Intel, Craig Barrett, CEO of Intel and Carlene Ellis are here. I have been a computer geek for 30 years. I majored in math and science when there were no women in the classes except me. I have done what I loved and I got paid to do what I loved and it makes it pretty easy to be here today.

I am also the mother of a 20-year old daughter at the University of Arizona, who despite scoring in the top percentile in math is doing nothing with it. I am also the mother of a 14-year old son, who hates living with math geniuses. So, that is kind of my household, my view of education. My kids have been in public school since day one. And their education is going to determine their future. So, it is that simple to me.

Intel, specifically is very interested in math, science, engineering and technology education and we are very interested in that from kindergarten forward. Technology is becoming a basic survival skill set. If you have any doubt about that just get out of Washington into the business life today and understand what skills are required to get a job. I sit on the John Glenn Commission with Craig Barrett, and we are saying loud and clear as hard as we can say it: This is a survival skill and this is a national emergency for the United States to worry about the skills of children in K-through-12.

So, our program is called Innovation in Education. If you think of it as a three-legged stool, the seat of the stool is all about innovating in education to get a better answer for the student. Craig and I feel very strongly there is only one measure of success: Student performance. And we can dodge that ball as long as we want to dodge it, but the students have to do better.

I didn't even know until I took this job in February of 1999, that U.S. children ranked bottom in the world in math and science education. I had no clue. I majored in

math. I have kids in school. That is the best-kept secret I can imagine. I think that is wrong. The minute the U.S. sees a problem we can fix the problem. We got to get people to see that issue. It is a huge issue.

The first leg of our stool is all about teacher development. I am going to spend my time on that. It is called Intel Teach the Future. Second leg of our three-legged stool is about coming in to the communities with a program we announced February 28th, called, Intel Computer Clubhouse Network. We are going to spend $20 million over five years implementing 100 computer clubhouses around the world in partnership with MIT Media Lab, Boston Museum of Science, HP, and Covad Communications.

The third leg of our stool is science competitions. When I came through school I am old enough to have seen Sputnik. When I came through school, living 90 miles North of Cape Canaveral, in Jacksonville, Florida, I was convinced that the world was going to come to an end because the Russians had launched Sputnik. So, my brother went to the Air Force Academy, I went to the University of Georgia, our parents had never gone to college. We saw education as our way up and out. Certainly it has worked.

Our third leg is science competitions. We think the kids that are doing math and science, the tough stuff, competing for awards are not recognized. We are going to recognize them. Science Talent Search starts tonight in Washington, D.C., and we will beginning a week long affair of science competitions in recognition for the top 40 senior and high school scientists in the United States. In May, in Detroit, Michigan, starts the Intel Science and Engineering Fair, which touches, and listen to this number, a million students around the world in science competitions.

Now, I wasn't too good at science fairs but these kids come up with some pretty good stuff. So, that will be in May.

So, let me go back to what we are here today to talk about, Intel Teach the Future.

Intel Teach the Future was announced January the 19th. A $100 million program over three years to train a half a billion teachers in how to integrate technology into their classroom. Not use this laptop or this laptop to do word documents, but use this device, which is with me 24-hours a day, to improve teaching and learning. It has got to be in the classroom. The students have got to be touching it and most importantly the teacher has got to be comfortable using it.

Mobile technology and E-mail have transformed the way business is done over the last 15 years. The Internet is the greatest technological revolution to have occurred since I began as a computer programmer in 1968. You can't miss those two facts. There is only one problem. We have got to get teachers comfortable using the technology to teach.

By the way, don't spend a lot of money on the kids getting comfortable. I can bring any three-year old in here and they can run this device. They don't have much trouble with that. But the teacher teaching a 5-year old in kindergarten can be very comfortable with this technology. And, by the way, they will have a lot more fun teaching and the kids will have a lot more fun learning.

So, our program begins this summer with 80-hour summer institutes to train teachers on how to use the technology, navigate the technology, do lesson plans, use the Net as the great research tool it is, and to get them comfortable where they are going to go back into their PC connected classroom and do a great job for their kids.

In closing, Craig used this quote in January and I think it is a great one "we are a technology company but this is what we believe computers aren't magic, teachers are." All we have to do is help them get there.

Thank you.

See Appendix C for the written statement of Carlene Ellis, Vice President For Education, Intel Corporation, Folsom, California.

Mr. Castle. Thank you very much, Ms. Ellis, we appreciate that.

I will turn to Mr. Lee next.

STATEMENT OF TONY LEE, SENIOR DIRECTOR, WORLDWIDE MARKETS, APPLE COMPUTER, INC., CUPERTINO, CALIFORNIA.

Mr. Lee. Mr. Chairman, Mr. Kildee, members of the Committee, thank you very much for giving us the opportunity to testify before you today.

I want to talk to you today about systemic change. When you are looking at legislation, while technology access certainly is an issue I echo the Chairman's statements that great strides are being made there but in terms of your legislation, look towards where you can get systemic change. The world is different. The classrooms of today are different. The kids are different. I echo Ms. Ellis's comments about the ability for young children to be able to use technology today. But how do you impact and drive systemic change into the U.S. education environment?

We believe that the focus needs to be around professional development. Apple has had many years working in this field; over 20 years of supplying services, and technology into the educational environment. Indeed, we have had a research program that went for over 13 years called the Apple Classroom of Tomorrow which is the seminal work in this referred to by many companies and the Government around how technology impacts teaching and learning. And the fundamental thing we found is that teachers have to be extremely comfortable in using the technology. It is not necessarily a question solely of technology access.

If we look at the latest research we see only 20 percent of today's teachers in the classroom are comfortable integrating technology into their lesson plans. That must be the focus or your legislation.

If you do that, you get a phenomenon of technology integration. Once technology is integrated into teachers' lessons plans, extraordinary things happen. And again, we have many instances of that from many states documented in Apples Classroom of Technology Research.

But when I say that the world is different let me give you two examples. As Ms. Ellis says, both of us use laptops. It is the world of today, how we drive most of our activities. I would suggest that both of us are relatively uncomfortable with paper-based documents. This is the environment where our children will be working in.

We recently came from a very large education conference, the Florida Education Technology Conference. And the whole environment was wireless. There were 100 teachers walking around with I-books, all of them connected to the Internet and you could see the excitement as lights went on in their heads, as they understood this concept of technology integration. All of a sudden what happens when the classroom is completely mobile, two or three kids move over to one area, they have a couple of computers, they are connected to the Internet safely and they can start to work collaboratively and then using concepts like desktop movies, they can show their work to their peers and then by publishing on the Internet to their families, starting to get that connection as well.

By integrating technology firmly into the classroom, you will fundamentally change the way education is driven and you will significantly increase effectiveness. And by doing that, focusing your efforts around how teachers are trained, we fundamentally believe is the most important thing you could be doing today.

In closing, the Federal Government's role in education is critical. Apple strongly supports the technology provisions as an integral part of the reauthorization of the Elementary and Secondary Education Act. And we believe that the focus for the Federal Government level should be no technology integration through professional development.

Thank you very much.

See Appendix D for the written statement of Tony Lee, Senior Director, Worldwide Markets, Apple Computer, Inc., Cupertino, California.

Mr. Castle. Thank you very much, Mr. Lee.

We will go to Mr. Bertsch next.

STATEMENT OF JASON BERTSCH, DEPUTY DIRECTOR OF POLICY, EMPOWER AMERICA, WASHINGTON, D.C.

Mr. Bertsch. Thank you, Mr. Chairman, Mr. Kildee for inviting Empower America to testify today. Technology and education and the deepening relationship between the two is one of our organization's primary interests. We echo everything that has been said so

far. Just as computers and the Internet have fundamentally reshaped the way we do business, they will also soon reshape education. Today I want to address two particular questions related to Title III and maybe get into the more general things in the question and answer.

First, what is wrong with Title III and, second, how can it be improved? As you know, it is a relatively new part of the Elementary and Secondary Education Act. The two biggest programs were first authorized in 1995. Since that time, the Federal Government has dramatically increased its spending on these programs. This year it will spend even more, $768 million on Title III. That is 21 times the size of the Intel Program. It is a lot of money. An even larger investment has been made through the e-rate program which will put over $2 billion during 2000 into wiring our public schools for the Internet.

These investments are largely responsible for the rapid growth of computers in our classrooms. This is a real accomplishment. I think you should be commended for it. But it is not cause for celebration. Why? Because we are not yet producing results either in teacher preparation or in student achievement. A recent report by Gary Chapman, Director of the 21st Century Project, the LBJ School of Public Affairs, found that the vast majority of U.S. K-through-12 teachers are novice or even completely inexperienced Internet and computer users. Another recent survey found that only 20 percent of American teachers feel well-prepared to use their new computer applications and know how to integrate them into their classrooms.

As far as student achievement goes, I will echo what Ms. Ellis said, that technology is not doing much good so far. In some cases it might be doing some harm. SAT scores, both math and verbal, are stagnant during the 1990s, and down sharply since 1960. Most disturbing of all, again to echo what was said before, in comparison to children from other industrialized nations on math and science tests, we are at the bottom of the barrel.

This is a shame not only because we are wasting resources, but because we know that technology, when used correctly, makes a positive impact on schools, on teachers, and on children. When considering Title III reauthorization then the truly critical issue is less one of inequity than of effectiveness. Do teachers know how to utilize or even operate their high-tech tools? Who is actually teaching technology to whom? Teachers to students or students to teachers? This might be called the digital generational divide. We actually think that might be more important than the traditional digital divide.

We have two basic recommendations. First, we propose consolidation of six of the seven Title III programs. This competitive grant, this new computer grant program should favor applicants that propose ways to combine high standards in teaching and technology and that focus on practical ways of integrating technology into the classroom.

In addition about 5 percent of this new consolidated program should be set aside for rigorous study of the grants and the lessons learned from the study should be collected and published in the best practices guide available on the Web.

Second, with the one remaining program, the Technology Literacy Challenge Fund, Congress should aim to promote innovation and encourage States to focus the money on areas that are under-served. States should be encouraged to use the Challenge

Fund money in coordination with the new competitive grant winners to make sure that we are using our computers intelligently.

Moreover, Congress should require States that receive funds under the Challenge Fund to show results in terms of parental satisfaction and other ways.

Empower America believes that the Federal Government's role should be limited, focused and vigorous, not scatter-shot. Better, more productive use of technology, not just more, should be the Federal Government's goal.

That said, I think it is important to put things in perspective. During the next several years, the Federal Government will be massively outspent by private financiers. The education industry, the K-through-12 market and other areas have recently attracted interest and lots of money from America's leading businessmen and venture capitalists. A recent report from Merrill Lynch declared that the education industry represents, in our opinion, the final frontier in private participation in public programs. Compared to other sectors that have been the subject of massive reform, the education industry represents the largest market opportunity for private sector involvement since health care in the 1970s." In other words, they are going to spend a ton of money in the education industry.

For Congress, I believe this is both good and bad news. It is good news because it means that you will have a lot of help preparing kids for the high-tech 21st Century. It is bad news or maybe it is just daunting because it means Congress will face private sector standards. How big a dent on math scores did the Education Department's $50 million make compared to Intel's? Are your efforts redundant? Who is spending their money on technology training more wisely and effectively; Congress or some young entrepreneur in Silicon Valley? If the latter, why not sunset the Government program?

These questions in Empower America's view are inevitable and the stuff of which free enterprise and healthy limited Government are made.

Thank you. I look forward to your questions.

See Appendix E for the written Statement of Jason Bertsch, Deputy Director Of Policy, Empower America, Washington, D.C.

Mr. Petri. Thank you very much, Mr. Bertsch.

We will turn to Mr. Winston next.

STATEMENT OF DAVID H. WINSTON, SENIOR VICE PRESIDENT, FABRIZIO, MCLAUGHLIN & ASSOCIATE, ALEXANDRIA, VIRGINIA

Mr. Winston. Thank you very much, Mr. Chairman and members of the Committee. I am pleased to be here today, not so much to make recommendations about a course of

action, but to describe the complexities of the Information Age in yet another of American life: The development of our children. I grew up in New York City and it is true that it is a place where you grow up quickly. As a kid, I was exposed to many positive things about the city, such as music and arts, but I was also well aware of the negative side of New York such as crime and drugs at a young age.

The Internet makes growing up in New York City look like growing up in Small Town, America, 25 years ago. There is virtually nothing that cannot be found on the Internet. From news to sports to the arts to libraries to how to build a nuclear bomb to hate groups to travel information to pornography to medical information to communication with millions of people, it is all behind that screen at your desk; a new digital window the world.

The opportunities are boundless and they have created the greatest economic boom the world has ever seen and will continue for the foreseeable future.

For adults, the Internet has become a new business tool, as well as an educational and entertainment outlet. But because it requires different skills and a different mindset, some adults embrace this new technology better than others. Unlike many adults, children do not view the Internet as a strange new technology that must be mastered. If TV defined the baby boomer generation, then computers and the Internet are the communications medium that defines this generation.

Having grown up with technology, today's children use the Internet intuitively. But the Internet, while being a vast resource, presents new problems as well. It is a window on the world, the entire world. It does not make value judgments about the information it brings to your desktop or your child's. That judgment is left to you or your child. Complicating the picture is the fact that many children are significantly better at using new information and Internet technologies than their parents or teachers.

In the research that I have done, this knowledge gap between parents and children, teachers and their students can be significant and it is often a source of friction. Frequently the technology skills of adults are different from children. Parents and teachers are good at applications such as word processing, spreadsheets, data bases, and the like; tools for businesses. Children are masters of the Web, getting on-line and communicating and they don't understand why their skills are not respected more. They are also better at playing games. While that many sound silly, games are generally where the cutting edge of technology is found. Children today are as comfortable on a PC platform as the Sony play station and Nintendo 64 or Sega. They use these different technologies like their parents used the telephone. Put more simply, adults tend to use technology to accomplish tasks and solve problems, and children tend to use technology as an avenue for satisfying their curiosity, a key motivation for learning.

Tech-talk has become a part of this generation's vernacular much as slang was once a part of ours. Kids today talk about the Net in everyday conversation, they exchange Web addresses like we used to trade baseball cards and in the process rapidly pick up complex skills, specifically around the communications elements of this technology.

This puts them generally well ahead of their parents and teachers. Unfortunately and more importantly, it often puts them well ahead of their own value system. These

kids have developed skills that have vast philosophical implications. Their ability to access information is unparalleled. The range of activities they can perform is enormous. They can use the Internet to access information for a great science project or hack into company's websites. They can learn about diverse cultures around the world or the philosophical construct of hate groups. They can see breaking news or they can see an unparalleled amount of sex.

They can do all this but do they have the maturity to choose the right path? For parents, this has been a frightening and difficult development. It is hard enough to develop values in our children given today's world, but with the vast array of material that is on-line that many parents find objectionable for their children, they are now demanding solutions.

Today, too many children's technology skills have outpaced their value systems; clearly society is going to have to help children build value systems at a younger age.

How do we guide children in the use of the Internet when their skill set is simply better than their teachers and their parents? Kids at the age of 11 or 12 have very advanced hacking skills. For many, blowing by blocking software is an easy task. In fact, for some it is the digital equivalent of sneaking a cigarette or a can of beer. Their parents and schools may never know.

How do we create broad-based solutions where schools are so different across America? My son's school, for example, prefers to emphasize an honor system with Internet use. It gives students rules to follow but does not use blocking software. By using this approach they help children develop their own value systems based on honor and trust. Other schools may want to institute blocking software because they believe it is the right solution for their particular school, because of class size or ease of access or because parents want it.

All of this points to the need for individual schools, working with parents, to develop policies of how best to integrate this technology into both children's lives and into our school systems. What they need is flexibility to develop the right approach and the time to implement this approach.

Blocking software will likely be an integral part of many schools' overall policies and they will need resources and skills to implement this software. But blocking software is only a tool that gains time. It will not resolve the value development problem.

However, for many schools they desperately need the luxury of time that the blocking software will provide. They need flexibility in how to use resources to help them. They need solutions that are appropriate for their specific school and situation. They need solutions that make them responsive to the concerns of parents. Finally, they need solutions to give students the ability to explore their curiosity, expand their horizons, excite their imagination, and develop their values.

Thank you.

See Appendix F for the written statement of David H. Winston, Senior Vice President, Fabrizio, Mclaughlin &

Associate, Alexandria, VA.

Mr. Petri. Thank you very much, Mr. Winston.

We will turn now to Mr. Chin.

STATEMENT OF JEFFERY CHIN, COMPUTER LITERACY TEACHER, ELLIOTT ALTERNATIVE EDUCATION CENTER, MODESTO, CALIFORNIA; ON BEHALF OF THE NATIONAL EDUCATION ASSOCIATION

Mr. Chin. Chairman Castle and members of the Subcommittee, thank you for giving me the opportunity to speak to you today about the critical importance of technology in the classroom. Educational technology is a crucial element of a quality education. Technology in the classroom, both enhances the educational experience and prepares students for employment in an economy growing increasingly dependent on technology.

In the classroom, students who have daily access to cutting edge technology perform better academically. Studies have found students who use technology in the classroom show more enthusiasm, have higher attendance rates, develop better writing skills and display a greater capacity to communicate effectively about complex problems. These studies confirm what I have seen first-hand in my classroom and the classrooms of my colleagues. Educational technology helps bring an excitement to the classroom, complementing our work by allowing students to see hands-on practical applications for math, science, and the broad range of curriculum topics.

The use of educational technology also reaches beyond the classroom to ensure that students are ready to compete in a global economy. Today's students will face a job market in which most, if not all, employment opportunities will require at least a basic technological competence. Computer literacy will often be a determining factor in employability for a wide-range of jobs, including those outside the traditional technology fields. Even today's fast-food jobs require rudimentary computer skills.

Learning technology skills, like other basic skills, should begin in elementary school. All young students should have the opportunity to acquire a foundation of skills and understanding upon which more sophisticated skills can be built. Given the importance of technological skills to students' future success, we should consider this foundation as important as fostering basic reading, and math skills in the early grades.

For example, elementary school students in my district now use word processors to create stories and use basic graphics programs to produce illustrations. Students also make new friends and learn about life in other parts of the country through E-mail pen-pals. Digital cameras allow students to provide a glimpse of their world to other students around the globe by posting their pictures on school Web pages. The Internet has allowed teachers to take students on virtual field trips to places thousands of miles away without leaving the classroom.

Ensuring that all our students have the opportunity to develop the necessary technological skills requires a strong commitment at the Federal, State and local levels. First, we must ensure that every student in every school in every community has access to the most up-to-date technology relevant to the curriculum. Supplying computer hardware and software to classrooms, however, will be inadequate absent an investment in professional development and training for educators.

Finally, we must ensure that we do not seek to incorporate technology into the classroom without understanding how the technology fits into the existing curriculum. While we have made remarkable progress in recent years in increasing classroom access to technology, significant gaps remain. Recent studies show that nearly every school has a connection to the Internet. The e-rate program has certainly been instrumental in increasing access to the Internet across the country.

This does not mean, however, that every classroom has Internet access or up-to-date hardware and software. The digital divide that exists along racial and economic lines continues to impact many schools and students. For example, while 74 percent of classrooms in low-poverty schools are connected to the Internet, only 39 percent of schools in high-poverty schools have Internet access.

The lack of access to technology in schools and at home translates into a widening gap for minorities and women in technology careers. Many older schools lack the infrastructure, including electrical wiring and power, to support educational technology or Internet access.

A soon to be released NEA study of school modernization needs found that States face more than a $53 billion in cost to make schools technology-ready.

Even those classrooms that have access to technology may have obsolete hardware or out-of-date software. In my own school, I see on a daily basis the impact of inadequate technology. I teach in one of two computer literacy labs at Elliott Center. One class has access to a modern computer lab with the newest computers and Internet access. My class, however, must use 10-year old hardware with obsolete software and no Internet connection.

While students in the first class are learning to use the most up-to-date technology and are developing the skills they will need to enter the work force, my students are using out-of-date hardware and software with little similarity to newer technologies. They will likely have to relearn technology skills when seeking employment.

For many students, particularly minorities or those from low-income households, schools offer the only opportunity to access technology. It is vital, therefore, that we ensure that students not only have access to computers, but that they have access to the newest computers and to software comparable to that which they will encounter in the work force.

Providing computers, software and Internet connections is just the first step to ensuring all students access to technology. Quality professional development and ongoing technical assistance for teachers is an essential element of any education technology initiative.

Even in areas where technology is available, software, hardware and Internet connections often go unused because teachers lack the skills and knowledge necessary to integrate them into their daily classroom activities.

Teachers often express frustration that the lack of available training makes it difficult to take full advantage of the wide-range of educational technology. Finally, we must ensure that we are providing and training teachers to use hardware and software that furthers the goals of the curriculum. My colleagues and I are excited about using technology to enhance our lessons, but we cannot incorporate technology without understanding how it fits into the curriculum. Technology is an important tool in today's educational environment, but it should supplement, not supplant, the role of the teacher in deciding how best to teach the curriculum.

Teachers should play an integral part in choosing which technologies work best for their students in their schools and classrooms. Maximizing the use of technology in the classroom requires this buy-in from teachers.

Finally, technology is a critical element of quality education. We must ensure that all students have access to the latest technology and that all teachers receive training that enables an effective integration of technology into the curriculum. We must modernize schools to enable use of the latest technology. We must provide funding for teacher technology training programs and for ongoing technical assistance.

In addition, continued funding for the e-rate program is necessary to ensure that all classrooms have access to the exciting resources and tools available on the Internet. Finally, any program to increase access to technology in schools must take into consideration the input and expertise of teachers, themselves, in determining what technologies will work best in their classrooms.

I thank you for the opportunity to let me speak with you today and I will be happy to answer any questions.

See Appendix G for the written statement of Jeffery Chin, Computer Literacy Teacher, Elliott Alternative Education Center, Modesto, California; on behalf of the National Education Association.

Mr. Petri. Thank you, Mr. Chin. That was very enlightening, very exciting in some ways, and I think of great relevance to what we are doing.

I just want to make the point that I think all of us up here consider technology to be a significant potential enhancement to education in this country. This is not a political issue. I don't think that this divides between Republicans and Democrats. And we are very concerned about how we do that, how do we incorporate it into the laws that a couple of you addressed, and what do we do to make sure that we are not hurting you in any way in terms of what you are able to do, at the same time enhancing what we have to do, which is to help our kids, at least as far as education is concerned, and technology in general. And I think you made some extremely valid points with respect to that.

Unfortunately, we are limited in our time here, and I would like to ask Ms. Ellis a question first. Maybe this reflects upon my complete opposite achievement levels in math and science than yours. This is the kind of question I almost wish I had asked you before to make sure I knew the answer before I have you saying it publicly, because I think math and science are extraordinarily important. But with the advent of computers, is there less need for particularly math and maybe science to some degree, or are math and science skills needed in order to better utilize the computers? In other words, this enhances the math and the science, and without it, you will never really be able to process as well as you could with it. I would be interested in the incorporation of the technology and computers and the math and science if you could share that with us.

Ms. Ellis. Yes. Let me just give you my personal opinion on this. What I think math and science teaches you through elementary school, high school and college, is it really teaches you how to think in many, many ways. The problem-solving skills and the inquiry-based learning approaches that occur in a great science curriculum and in a great math curriculum, which allows the learner to struggle and kind of get the wrong answer before they get the right answer, those two skill sets are critical for workers in business. So I do not see that as anything that goes away, because we automate the way something happens.

As far as basic computing skills, pardon me, but computers are not really that smart. They know how to add, you know, basically, and from adding, they get to subtract, multiply and divide. So, you know, the thinking skill sets that are still required to write a whole lot of code that runs the computers of today, despite all of our best inventions, that is not going away.

So I don't know what you would say, Tom, Mr. Lee, but I don't see that changing. I think we need the basic skill sets of math and science moving forward.

Mr. Castle. Okay. Let me turn to Mr. Lee on a slightly different subject. He and I had a chance to talk a little before the hearing, and we talked a little bit about, and Mr. Bertsch mentioned this and others alluded to it, in fact, you all alluded to it in some way or another, but the lack of understanding sometimes amongst those of, shall we say, a different generation and the very young kids, to understand technology in general, the use of computers more specifically, and particularly with respect to education, which is our concern in this Subcommittee. Obviously, teachers and administrators, in terms of what their needs may be, as Mr. Chin has testified to, in schools, hardware, software, ability to teach or whatever it may be. We talk about the digital divide, which is an economic issue, but there is a generational digital divide too, and it is extreme. It is absolutely right. I think Ms. Ellis said that, somebody said that a 3-year-old can probably run a computer better than those of us who are a heck of a lot older, and that is a heck of a problem when you have a 45-year-old teacher and you have a group of 15-year-olds who know that computer inside out, can find anything on the Internet they want, or whatever it may be. I am worried about closing that generational divide if we can, and maybe that is just something that has to happen culturally and societal, and there is nothing we in Congress can do. But if we have teachers out there who have that responsibility to use computers to help in their teaching, it seems to me that we do have to take some steps in that direction.

I would be interested in your comments on that. I know you sort of agree with the hypothesis of what I am stating, but I would be interested in any solutions or ways we

could be looking at doing this better than we do now.

Mr. Lee. I believe this comes back to the element, which I think was the one consistent element across all of our testimonies, which is about professional development and comfort levels. I will take you back 25 years when my uncle got his first VCR, and he certainly could not program it. When I went to visit I was shocked by this piece of technology there. And it was exactly the same phenomena. My 7-year-old nephew came in and was the one who sat down and programmed the VCR.

Now, things have moved on a lot in that space. It is not just about computers, it is a technology thing. However, it is not just to do with science and math. My degree is in physics. I believe this issue goes across all aspects of learning, and certainly all aspects of teaching. What we see is and this is based again on significant amounts of research which Apple has done with a number of schools in multiple states over many, many years. When we see teachers becoming comfortable implementing the technology, comfortable using the technology, they go through a series of phases. They first of all, start to understand it, then they start to be comfortable with it. Then they start to adapt their own lesson plans to incorporate it, and then they start to change the way they teach. And that is when you start to see the significant change in performance, in teaching and learning today.

And it is that comfort level which is fundamentally important. I do not see this as a generational issue. I have seen many, many people, say, taking one of our new iMacs, for example, getting to know how it works very, very quickly. Most of the people who use iMacs are on the Internet within an hour. It is not the technology any more. It is about becoming comfortable with integrating it into your life.

Apple has an environment called the Apple Learning Interchange. One of our metrics for measuring how successful we are in terms of technology integration in the classroom is how many people are collaborating using the Apple Learning Interchange, and I think we are up to 30,000 teachers who regularly log on and can collaborate with other teachers about learning.

In this case I think the technology has reached a level where it is relatively easy to learn to use these tools to help you communicate, to help you teach and to help you learn. It is a matter of giving access to the teacher, the tools they need and the time they need and the funding they need to actually get over that hurdle, and then I believe the rest takes care of itself.

Mr. Castle So your message is that any of us can learn who perhaps have not learned before with the present technology, which is there. It is no longer such that we are unable to learn, and if we pay attention to it, we could, and then we can help the kids.

Mr. Lee. Unfortunately, Mr. Chairman, I am not giving you any excuses. That is what I am saying.

Mr. Castle. I needed one, but I appreciate that. My time is up, unfortunately, because I have a lot of things I could ask all of you, but let me turn to Mr. Kildee now.

Mr. Kildee. Thank you, Mr. Chairman.

One of, or perhaps the weakest link in educational technology seems to be the professional development of our teachers. If we were to, Mr. Chin, give a grade level to the professional development of our teachers in this educational technology, would they get a B or less? In general, are we doing well in the professional development of our teachers?

Mr. Chin. In general, as far as professional development, probably a D, maybe a C- or barely passing, because professional development has not been a priority. It has been a priority up to this point to put the machines in the classroom, and unfortunately, it probably should have been the other way around, that we should have trained the teachers and made sure they were comfortable with this equipment and showed them how to integrate it into their curriculum before. However, I am sure when you are facing your constituency and you are talking about spending millions of dollars to help kids or millions of dollars to help those teachers, well, you are always going to get the kids first. And the kids are first. And so the machines are there. The hardware is there. The software is in place. However, many times the machines just sit because teachers don't know how to use it, don't know how to incorporate it into their technology, and so it is not as though we are getting a failing grade, but we are barely passing, because there are those teachers who or those school districts where teachers are getting the development, they are learning it themselves, and they are incorporating into the teachers, they are sharing it in their teaching, they are sharing it with the other teachers. However, with adequate funding and a priority given to staff development now that we have the machines in place, before the machines become obsolete, if we can get the funding to do the training, the teachers can start incorporating that into their curriculum.

Mr. Kildee. Taking your response with Mr. Lee's, who is assuring the Chairman he could learn.

Mr. Chin. It is never too late.

Mr. Kildee. What must we do, what can we do in pre-service training and then in-service training? I think maybe both of you could comment on that, because we have teachers already out there in the classroom who would like to know this more, but if you could, both of you. How about in-service training?

Mr. Lee. Certainly. Both of those elements are critical. That's exactly right. From a pre-service perspective, we need to start to work to educate our new teachers about the environment they will be working in. And in hand with that, we need to be working with our existing teachers to free up the time and give them the materials and the reason to actually drive to do this integration. Both of those things must happen, with the main focus being, preparing our children for the environment which they are going to be in within 5 to 10 years time. It is all about trying to get ahead of the curve, and understand the environment which we are preparing our children for.

And absolutely part of that strong message is working with our teaching training in institutions, colleges of education, to help them understand the environment that teachers will be teaching in within a few years time.

Mr. Chin. And I will just add to that too, in order to provide the funding to put the hardware in the teachers' hands so they have it, so they can be taught how to use it, and not just the machines that are put in the classroom, but how they can use the equipment to

further enhance their teaching, and doing the training, the in-service training while they are on the job can be done.

Mr. Kildee. If you could help us on Title III where we attempt to address this problem. Should Title III be rewritten, authorization language, and also funded better so we can do both pre-service and in-service training? Would Title III help us address this problem?

Mr. Chin. Yes, it will, and I think Mr. Lee made a good point when he talked about how getting on board with the educational institutions now that are doing the teacher preparation program, that we can start tailoring the instruction for teachers_pre-teachers on how to incorporate this into their teaching as well as with teachers on-board now, then it will be a better mix.

Mr. Kildee. You know, just thinking, I taught Latin, and that is not taught much any more. I bought for my children, when they were very young, an Apple, and thank God, one is at Harvard now doing his master's; the other is at University of Michigan_

Mr. Lee. I couldn't possibly comment.

[Laughter.]

Mr. Castle. And it is all because of Apple?

Mr. Kildee. Good genes of the mother too.

But I can actually see in teaching language, I mean there is no subject in which the technology, computer technology could not be helpful. I cannot think of a subject. I can imagine myself using that in language teaching as very helpful.

Mr. Lee. Again, if I may, there is one very good example we found is teaching Spanish, although this absolutely applies to teaching English as a second language in a college of higher education. It is an immersive environment, and the way the teacher is doing this is by using video streaming of Spanish soap opera, and then the language tuition comes in whereby the children in this case the are being asked to produce their own Spanish soap opera and produce their own movies, using Desktop Movies. And they started out with a couple of talking heads, but they get engaged, and that is the fundamental issue around learning is using this technology to get the children engaged. And now the kids are scripting, you know, complex Spanish soap operas and producing video, and streaming them out for their parents to see. That is what education is all about.

Mr. Kildee. Thank you very much, Mr. Chairman. And thank the witness. I believe a vote is coming on soon.

Mr. Castle. We have, I think, three votes coming up. We have 15 minutes before that vote needs to occur. I'm going to turn to Mr. Isakson now. I don't know how much further we can go beyond that. We may have to come back. That vote is going to take about 30 minutes though because of the fact it is three of them, before we can come back.

But let me just say that Mr. Isakson is a very significant member here with respect to all of this, because he is a member, I think the co-chair actually, of the Web-based Commission with Senator Bob Kerry and others, which is looking to identify high-quality

software and help close the digital divide, so he is very involved with this issue, as he has been in education back in Georgia, so we are pleased to have him here. Mr. Isakson.

Mr. Isakson. Thank you, Mr. Chairman. I am pleased to serve with Mr. Winston on that Commission as well.

First of all I would like to ask Ms. Ellis and Mr. Lee a question, and in thinking about your answer, you need to forget about the loyalties to those who sign your paycheck and the products they produce.

[Laughter.]

And you have to put yourself in the role of public education that has got a tough decision to make in terms of the cost of doing what Mr. Chin wants to do, and that is have everybody having the highest and the best technology. And my question is this: if you had to make a recommendation to public education today as to the infrastructure to support technology in the classroom, and you went one way or another, would you go hard-wire or would you go wireless?

Ms. Ellis. The question is hard-wired versus wireless?

Mr. Isakson. Yes. And let me tell you by giving you a little bit more information. Remember, you are making a recommendation under the goal of 100 percent accessibility to hardware and software. You are talking about universal access. You are talking about the state-of-the-art technology, but you are also talking about it in the context of a classroom and students, and the teachers and their training, and you are talking about an institution that there is not enough money, unlike businesses like mine before I came to Congress, where I bought a lot of stuff that was out of date before I could install it. Education cannot afford to do that. You are dealing with a consumer that desperately needs to make the right decision each way.

Given that, if it was hard-wire or wireless, given the longevity of the need that investment must last, which would you recommend?

Ms. Ellis. Well, again this is Carlene Ellis's opinion. Given no bounds on money, I would go wireless and mobile.

Mr. Isakson. Okay. But given the boundaries of public education, that is the context of the question. Your answer may have answered what I...

Ms. Ellis. I think is it more important to put the technology in the classroom wired and glued to the desk, than not have it there at all? Yes.

Mr. Isakson. Okay. Mr. Lee?

Mr. Lee. The answer for us is definitely wireless. The reason, and there are multiple ones. The top two reasons and the first which is very much focused around the digital divide. Some of the more well-funded establishments can certainly put in wired infrastructure, and can afford to do that. And E-rate has allowed that to happen and had gotten the necessary electrical infrastructure to make the whole thing work and connect these classrooms to the Internet. In less well-funded schools, that is not possible. E-rate

may give them the funding to bring the cabling in, but the classrooms simply do not have the electrical infrastructure to actually make the rest of the connection work. That funding is not being effectively used. In addition, a lot of these environments, if you start to put cabling, you have to worry about things like asbestos and a whole range of other issues which are fundamental to the infrastructure in these schools. Wireless gets around all of that.

The second reason is pedological, that when you give access both to teachers and schools and children to information and make it available wherever they are, whether they are out in a home, in any environment, when they are out on a field trip, and allow them to collaborate wirelessly, the whole engagement around learning changes. So I would certainly say wireless for fiscal reasons, and I would also say wireless for pedological reasons.

Mr. Isakson. Not to avoid our other three panelists, but I have a second question, because you all represent the private sector, and we have all these issues we are dealing with on the digital divide. I want to ask you a hypothetical question. Hypothetically, if our teachers were in fact trained and were user friendly with technology and integrating it in the classroom, which we hope to improve with Title III, and hypothetically, if every child who can play Sega and everything else when they get to first grade anyway, also is user friendly with the Internet, and you had basically a public education system that was up to speed from the standpoint of instruction and integration, meaning you had answered the wireless question and everything else, I have a feeling that the computer; your industry would be giving a lot of the stuff public education is having to buy from them today to them because they would have 100 percent utility and would want those students to become friendly with their products so they later bought other hardware and software. Is that a fair assumption? I won't say you said this, but it just seems to me…

Ms. Ellis. I am sure it would go back very fast.

Mr. Isakson. I am sure it would so, I am a University of Georgia graduate, so I will stick up for you, since you went there too, but I guess really I will just make a statement, because we do have to go to vote, for you all to think about.

Public education in the United States of America and, forget about the federal role for a second, which is relatively small as a percentage of funding public education. There is not enough money to buy every product that Intel or Apple make or Microsoft or any of the hundreds of thousands of people. And in business, I made all those mistakes, where I bought too many things, because the vendors were really in control of me. I wasn't in control of the vendors. Public education, to me, is at an extreme disadvantage in the technology world right now because I think they are at the mercy of the vendors, per se. And I don't put vendors in a negative term. So I am on this mission to try and get the word out. If we can get all our kids using technology for academic pursuit and improvement, and all our teachers integrated in the classroom, we can maybe become more in control than the vendors and bring down the cost of what we are having to buy in order to keep ourselves contemporary so Dr. Chin has, or Mr. Chin or Dr., which ever it is, has what he wants. Is that a totally outlandish idea?

Ms. Ellis. Well, I think; are you Johnny Isakson?

Mr. Isakson. Yes, ma'am.

Ms. Ellis. I know you.

[Laughter.]

Ms. Ellis. No, I do.

Mr. Isakson. I am in big trouble now. I have to go vote. Excuse me.

[Laughter.]

Ms. Ellis. No. I am Jim Ware's sister-in-law.

Mr. Isakson. You have got to be kidding?

Ms. Ellis. No. I knew you would be shocked.

Mr. Isakson. You know too much.

Ms. Ellis. Yeah.

[Laughter.]

Mr. Castle. Does anybody here have any confession to make?

[Laughter.]

Ms. Ellis. A couple of points to you. Number one, the cost of computing, not to Intel's benefit, bottom-line wise has come down dramatically in the last two to three years. You can buy a highly functioning computer for 7, $800. I do not see anything to change that downward trend. We got to get the wireless and the network infrastructure to come down comparatively, and then I think you are right. I think as ubiquity occurs, the cost of the devices, per se, is really not going to be the issue.

Mr. Lee. I absolutely echo that. If government does its part by putting that infrastructure in, then everything in terms of the industry is totally driving in that direction. Costs of our systems have done nothing but decrease over the last 20 years. We do not see that stopping.

Mr. Isakson. Thank you, and it is a pleasure to see you, Ms. Ellis. I will talk to you outside.

Ms. Ellis. All right.

[Laughter.]

Mr. Castle. Mr. Wu had a couple of brief; we are getting close on our time to go for our vote, but Mr. Wu has been very accommodating. We would like to give him whatever time he can put these questions in.

Mr. Wu. Thank you, Mr. Chairman. And I have two questions that may or may not be amendable to quick answers, and if you all would prefer to get back in writing, you know, this is not a one-day issue for any of us. We will just work with you in the long term.

The first question is: one of the troubling phenomena that one sees, and I guess I would like to aim this at Mr. Chin and Ms. Ellis, is the drop-off in math and science scores and participation among young women, girls in grades 6, 7, 8. It seems that girls track through the early grades, and even excel in the early grades, but then there is a drop-off. And I would really like to try to get my arms around that particular phenomenon, you know, what causes it? What can we do to try to address that? There is a program in Oregon that tries to address that. I don't know how successful they are.

Ms. Ellis. You want me to go first? I think it is a significant problem, and frankly, as I said, from my background, I don't see it getting better. The numbers are not getting better. Women in engineering degrees are flat to down. Engineering degrees are down dramatically over the last 12 years. And the computer gaming business of dropping bombs and shooting guns and knocking blood out, frankly, never appealed to my daughter, and I cannot imagine that it is going to appeal to others. So I am concerned.

Intel, we are doing a lot of work, we are doing a lot of research. We have girls programs, teenage programs, but the drop-off between fourth and eighth grade is huge.

I think there are a couple of issues. The elementary school teachers teaching don't know math, don't know science, and don't love either one. It is an exception where there is an elementary school teacher that got into elementary teaching out of love for math and science. My children have had a couple that were fabulous. All the rest avoided it like the plague. That is a problem. That is a real problem. That role model is set very early.

Secondly, somehow girls are coming through school thinking only weird people do math and science, including my daughter, which is quite a story. So there is something systemic genetically here going on, in my mind, to make it not cool. Now, I don't think it is just a women's issue though. I think engineering degrees are going down across the board, so I think it is a systemic thing.

Mr. Wu. I apologize, but apparently the time has become so tight, that we really have to scuttle along to go make this vote. But if I may just lay out this one, the broadband issue. We have a hard enough time wiring schools for just straight Internet access. We are beginning in some other places to look at broadband access from the classroom. If you all have any comments, materials on that, I would very much look forward to receiving it. They will keep this vote open for the chairman, but not for me, so we had better hurry along.

Mr. Castle. They might keep it open for the Chairman of the Committee, but not the Subcommittee. They won't keep it open for a second for me.

Let me thank Mr. Wu very much for shortening his time a little bit. He is very interested in these issues, and we appreciate his attendance.

The good news is that we are not going to come back. While there are other members who may have wanted to come back, they are on their own_they were not here.

So this will bring it all to a close. I would normally come down and thank you all personally. I won't have time to do that. We are going to hit the ground running here. But I do want to thank you. What you have had to say today is of extraordinary importance. These hearings that we are having on this subject, will help shape future policy as far as this Subcommittee is concerned, and just hearing what you have to say I think helps us all in our thinking when we go back home. So I do thank you very much, and with that, we stand adjourned.

[Whereupon, at 2:18 p.m. the Subcommittee adjourned.]

Appendix A-the written statement of Mr. Michael N. Castle, Chairman, Subcommittee on Early Childhood, Youth and Families, Education and the Workforce Committee, Representative from the state of Delaware.

STATEMENT BY CHAIRMAN MICHAEL N. CASTLE
SUBCOMMITTEE ON EARLY CHILDHOOD,
YOUTH AND FAMILIES
HEARING ON TECHNOLOGY IN EDUCATION

March 8, 2000

Good afternoon. I would like to take this opportunity to welcome you to today's hearing on an issue that is very important to all of us - the use of technology to expand and improve educational opportunities for our children.

Over the past year, this Subcommittee has held several hearings on this important topic and we have heard witnesses describe innovative state and local efforts to integrate technology into the classroom.

In one such instance, the Capital School District in my state of Delaware has partnered with industry and used federal Technology Innovation Challenge Grants to provide students with the technology to extend learning beyond the traditional school day and help parents stay involved in their child's education. More importantly, as determined by the University of Delaware, participating students significantly improved their scores on the Stanford 9 Achievement test in both reading and math by 24 and 16.1 percentile points respectively.

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Today, we will focus more specifically on the role that industry can and must play if we are to be successful in helping all schools gain access to technology and use it to raise student achievement. We will also examine other issues related to education technology, including the best way to protect children in schools from inappropriate materials on the Internet.

Through Title III of ESEA, the program which houses the majority of federal education technology programs, I think we can all agree we have made great strides in helping schools obtain computers and connecting them to the Internet. But we can also agree that we need to do more than simply place a computer in the classroom.

A recent survey released by Education Week shows that training plays a critical role in how teachers use educational software and Web sites, or "digital content." Teachers who have more technology training are more likely to use digital content in their classrooms, feel better prepared to use it, and rely on it more heavily than teachers with less training

For this reason, we must help our teachers understand technology -- and its benefits -- and teach them to integrate it into their lessons. We must abandon traditional professional development programs, which typically involve a day or two of in-service training -- in favor of programs that deliver high quality, on-going opportunities for training in education technology.

The same survey shows that teachers struggle to find high-quality software and Web sites to use for their classes, and many educators who are interested in education technology are overwhelmed by the literally hundreds of thousands of products that are offered in this ever-expanding market. We must help them identify the high-quality programs and products that best suit their needs.

Finally, to make sure these investments in computers, professional development and digital content pay off, we must ensure that our schools to have the tools to evaluate the success -- or failure -- of their efforts in the area where it matters most -- the academic improvement of their students.

Given our efforts to reauthorize the Title III programs in the coming weeks, this discussion is especially timely, and it is my hope that we can draw from today's hearing to strengthen our federal programs and make education technology a reality for all children.

Again, I thank you for your attendance today and I now yield to Ranking Member Kildee for any opening statement he may wish to make.

Appendix B-the written statement of Mr. Dale E. Kildee, Ranking Member, Subcommittee of Early Childhood, Youth and Families, Representative from the state of Michigan.

Statement of the Honorable Dale E. Kildee
Ranking Member, Subcommittee on Early Childhood, Youth and Families
Hearing on Education Technology
March 8, 2000

Good morning, I am very pleased to join chairman castle in welcoming the witnesses at another of our subcommittee's hearings on education technology and efforts to reauthorize the Title III education technology programs. I want to join him in thanking the witnesses for attending today's hearing and know that both of us are looking forward to your testimony.

Technology in our classrooms and increasing its access to disadvantaged children is an essential component in raising the educational achievement of our nation's students. Most states and school districts, with help from both the public and private sectors, have made great efforts to increase access to technology, especially emerging technologies. Unfortunately, the digital divide, or the separation between the technology haves and the technology have-nots, still continues to plague our nation.

Low-income areas and schools have fewer computers, sparse access to the Internet, and teachers without the skills and knowledge necessary to integrate technology in the classroom. In addition, our girls continue to have less opportunities and experiences in school that would lead them to careers in high-tech fields. Access to and understanding of technology can no longer be limited to computer experts – everyone, but especially our children, does and will utilize technology in their everyday lives.

Clearly, one of our priorities in the reauthorization of title iii must be to help with the effort to close the digital divide.

No better example of technology's impact on student achievement is evidenced by last year's, long-term study of the West Virginia basic skills/computer educatio. gram, which we will hear about today.

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This study showed that technology was an important factor in helping students make significant gains in basic educational skills and achieve to high standards. More importantly, the study found that the West Virginia's technology program made its biggest impact on the neediest children and rural children without computers at home. These disadvantaged children showed the largest gains in student achievement and this study found that the education technology resources provided in schools was a major factor in accomplishing this feat.

In our efforts to evaluate current federal technology initiatives, we should not loose site of the fact that simply placing technology in our classrooms is not enough. Both our new teachers and our veteran teachers must have the knowledge and skills to integrate technology into everyday instruction and teaching. Preservice training and professional development in this area is critical to technology having a positive impact on student achievement, as is evidenced by the West Virginia study.

It is my hope that our reauthorization effort for Title III includes a new and expanded focus on technology training for our teachers.

Lastly, I believe we need to take a critical look at our existing title iii programs. However, in this critical examination, we should not back away from targeting technology funding to disadvantaged children. It is too important that we work to close, not exacerbate the digital divide.

I thank you, Mr. Chairman, for holding this hearing and I look forward to the testimony of the witnesses.

Thank you.

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Appendix C-the written statement of Carlene Ellis, Vice President For Education, Intel Corporation, Folsom, California.

Testimony to the Committee on Education and the Workforce
Subcommittee on Early Childhood, Youth, and Families
By Carlene M. Ellis
Vice President and Director, Worldwide Education Programs
Intel Corporation
March 8, 2000

Good afternoon. Thank you for the opportunity to appear here today on behalf of Intel. As a leader in the computing industry, and supplier to the new worldwide Internet economy, we have a great deal at stake when it comes to the technological literacy of the population. Our CEO Craig Barrett is fond of saying that after the business of running our business, our top three priorities are education, education and education. Why? Because the economy of the future depends on the quality of our schools and the ability of our students to compete in an increasingly technical world. It was true 50 years ago and it's true today. The difference today is the rapid rate at which people need to adapt to change and cope with the sheer pervasiveness of technology around us. The education system has not kept pace and we need to help.

The ability to use computers has become indispensable to educational, career, social and cultural advancement. Technology literacy has become not only a basic job requirement, but also a basic life skill. You've heard the results of the TIMSS study ad nauseam – when it comes to science and math achievement, U.S. students perform miserably. At the same time, though a growing part of the national and global economy depends on the technology sector, fewer students – especially in the U.S. – are entering these careers. These are worrisome trends for Intel and for the economy in general.

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As a high-tech manufacturer and employer, we care about how technically adept our future employees and future customers are. Personally, as a math major and as an American who grew up during the Sputnick era, I can't imagine why we'd want our workforce to be so far behind in math and science. It is critically important to have a science-savvy population – people who can design the next generation of products and people who can make wise decisions about the use of those products.

Without broad science and technology literacy, we risk a two-class culture. Any citizen who does not have some facility for understanding and using technology tools will ultimately be denied a voice in society. Those who are fluent are the ones who will be making the decisions, and today that looks like small percentage of the population deciding the fate of many others.

So what is Intel doing about it? Our mission, quite simply, is to be a major force in improving science, math and technology education. We launched a global initiative this year -- *Intel® Innovation in Education* -- that focuses on preparing today's teachers and students for tomorrow's demands. Specifically, our goals are to:

- Improve science and math education in K-12
- Improve the effective use of technology in the classroom
- Broaden access to technology and encourage women and minorities to enter technical careers

We currently have two major programs focused on science education, the Intel Science Talent Search and Intel International Science and Engineering Fair. These science competitions allow

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us to recognize and reward the achievements of today's young scientists and their teachers, and shine a spotlight on what we think is the best way to teach and learn science. Both competitions are based on a student-directed, inquiry-based approach to learning that has been proven effective in engaging students and promoting a deeper understanding of science.

For those who are not familiar with these competitions, the Intel Science Talent Search (Intel STS) which kicks off today over at the Renaissance Mayflower, is the country's most prestigious science competition, a 58-year-old program often considered the "Junior Nobel Prize" for U.S. high school seniors. The student projects are on display for the public Saturday and Sunday at the National Academy of Sciences and I invite you all to take a look at the amazing work these kids have accomplished. The Intel International Science and Engineering Fair (Intel ISEF) is the largest and most comprehensive high school science competition in the world. This May, some 1,200 students from about 50 countries will compete in 14 scientific categories in the 51st ISEF in Detroit.

When I took the position of director of worldwide education programs about a year ago, I spent some time analyzing where Intel could actually have an impact in improving education. One issue that came up time and again as an area of great need was professional development for teachers. This is also an area where Intel has learned a great deal over the past few years about what works when it comes to effective technology training. We plan to use that knowledge, along with an investment of about 100 million dollars, to train teachers around the world.

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Secretary Riley has urged us all to invest in sustained professional development. Improving teacher quality is absolutely at the core of affecting change in our schools and achieving excellence in the classroom.

The Intel® Teach to the Future program, which we announced in January, is designed to specifically address the barriers teachers face in effectively applying computer technology to improve student learning. Over the next three years, our investment in cash, equipment, curriculum development and program management will train more than 400,000 classroom teachers in 20 countries around the world. The program is supported by Microsoft in the form of significant software donations, and a number of computer manufacturers offering donations and discounts to participants in the program. We believe this is the largest private industry effort to date -- valued at nearly half a billion dollars -- to insure technology is used successfully to improve student learning.

Intel Teach to the Future offers a flexible, modular curriculum developed and delivered by teachers for teachers. The comprehensive training each teacher receives will prepare him/her to incorporate the use of the Internet, web page design and multimedia software into current lesson plans and to align them with district, state and national standards. Every teacher participant is guaranteed access in their classrooms to the hardware and software necessary to put their training into practice. The training of a group of local Master Teachers ensures that knowledge and expertise will remain within the school district and help to maintain an on-going community of support.

Our goal with the Intel Teach to the Future program is to integrate technology into the fabric of day-to-day teaching to measurably enhance higher-order thinking and creativity. Given the results produced by the predecessor to this program, Intel ACE, we are convinced that computers with powerful software and Internet access have the potential to be extraordinary problem-solving and creative-thinking tools. Results from Intel ACE, which trained 3,200 teachers, showed that 84 percent of the participants found using computers improved their instruction and 80 percent found their students' learning enhanced. These teachers have gone well beyond the basics to being able to integrate technology into their daily lesson plans.

The good news is that Internet access in public schools increased from 35% to 95% 94-99 and classroom connections increased from 3% to 63% (NCES, Feb. 16). This was no accident; it was achieved by a concerted effort by government and the private sector. But the secret to technology literacy is not the equipment alone; it's the teachers themselves. What has become apparent is that equipping our schools with technology is just the beginning, not the end of the challenge. The real challenge lies in filling a vast training gap, and in providing training that can go beyond the basic mechanics of operating a PC or surfing the Internet.

According to a 1998 study undertaken by the Milken Exchange on Education Technology, teachers on average receive less than 13 hours of technology training per year, and 40 percent of all teachers have never received any technology training. In addition, teachers receive far less curriculum integration training than basic skills training. Some 42 percent of teachers had six or more hours of basic skills training within the past year, compared with just 29 percent of teachers who had an equal amount of curriculum integration training. And yet, research shows that

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training on integrating technology has a greater impact on teachers than basic technology skills training. Clearly, the key to successfully integrating technology into the classroom will not be in installing more hardware or software, or wiring schools to the Internet. The key will be in training teachers, themselves, to be the integrators. Through Intel Teach to the Future, teachers will receive 40 hours of training that includes hands-on instruction, peer review, and development of assessment tools to insure technology is applied in ways that are effective.

Teachers have an extremely tough job. They are hungry for current technology that's going to enable their students to do better at the end of the day; they are hungry for a better way to teach. And make no mistake; this is not a U.S.-only phenomenon.

I recently hosted a visit from China's vice minister of education, who wanted to understand Intel's programs in education and technology and how they could be implemented in China. I also traveled to India to examine the education system there. The Indian government, much as the Chinese government, is not at all confused about the role education has in improving their economy. And they are not at all confused about the role of technology in improving education. They understand that they operate in a global information economy and that their key to success will be education.

We believe that our industry must band together and form a partnership with those on the front line – the teachers who are passionate about their work, and who see the possibilities of technology. They are the real magic. It is time for business leaders to bring their resources to

the table and work together with the education community to develop solutions. Our students must succeed, and for that to happen, our teachers must first succeed.

In addressing teacher training, we are in effect, getting at the education system through the "front door." It's a direct approach. But if that's the front door, there is also a "back door." The back door is through the community, and this is where our third goal comes in.

A primary objective of community-based education is to help kids graduate from high school who might otherwise have failed; to get kids to go to college who might otherwise only have finished high school. These are crucial goals.

As I've said, we believe that technology skills are now essential life skills. Even if you don't believe that, they are certainly essential job skills. The U.S. Department of Commerce estimates that by the year 2000, some 60 percent of jobs will require proficiencies in the use of a broad range of information technologies. By 2005, the Bureau of Labor Statistics estimates there will be growth of 70% in technology related jobs.

There's no question that technology needs to be available as broadly as possible. At Intel our focus is in two areas: broadening access to technology in schools, colleges, households, and the community; and more importantly, providing the skills needed to use the technology meaningfully to play a role in the new economy.

Last week we announced a major new initiative in this area, Intel Computer Clubhouse. The Intel Computer Clubhouse is a successful and replicable model that uses technology creatively to enable under-served youth to acquire the tools, problem-solving skills and confidence for successful lives. In partnership with the Museum of Science, Boston, its award-winning Computer Clubhouse and the MIT Media Lab, Intel will support the establishment of 100 Intel Computer Clubhouses in under-served communities worldwide. The goal of the Intel Computer Clubhouse Network is to proliferate the highly successful Clubhouse learning model (15 Clubhouses exist today) and establish it as a replicable model for technology learning. Over five years, the Intel Computer Clubhouse Network will touch the lives of more than 50,000 young people.

Technology "access" is the starting point, not the end solution. The Clubhouse seeks to inspire youth through self-directed exploration and access to mentors who have creative ideas on how to use technology. The Intel Computer Clubhouse is both a physical place and a learning philosophy. It is a creative and safe after-school learning environment where young people (ages 8-18) from under-served communities work with adult mentors to explore their own ideas, develop skills, and build confidence in themselves through the use of technology.

In the Clubhouse, youth express themselves through projects based on their own interests, creating computer-generated art, music, and video; developing scientific simulations; designing their own animations; building kinetic sculptures and robots; developing their own Web pages; and programming their own computer games. At the Clubhouse young people only play

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computer games they design, watch videos they create or listen to music that they compose themselves.

Intel is providing the financial, technical, career, and volunteer mentor support to proliferate the Intel Computer Clubhouse Network globally. In addition to equipment donations, a team of Intel professionals will work with the Clubhouse to install the technology and networking capability to link Clubhouse youth around the world and provide technical training to Clubhouse staff and members. Intel will invest $20 million dollars over the next five years.

Scientific and technological literacy is critical to success in the economy of the future and full participating in society. Intel is not alone in this industry in recognizing where the needs are and where we as an industry can contribute. And I'm excited to see a number high-tech leaders rally to put their resources on the line and make a commitment to improving access and understanding.

But ultimately, the responsibility for transforming teaching and learning for the new economy is a matter of national significance that is too important to the nation's economic and social well being be industry's alone. The federal government has demonstrated extraordinary leadership and commitment to the goal of technology literacy, manifest for example, by the programs and policies embodied in Title III of the Elementary and Secondary Education Act. In the past five years, Title III has served to galvanize support for technology literacy at the state and local level. It has leveraged investment in infrastructure and connectivity in the nations' schools and encouraged important public- private partnerships. Of particular importance, Title III has begun

to bring a measure of equity of technology resources and expertise to the school most at risk of being left behind.

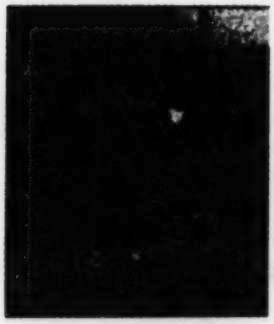
With the reauthorization of ESEA, Congress has the opportunity to renew and broaden its commitment to technology literacy. We urge you to do so, and pledge that Intel will be a full partner in that effort. More specifically, we ask that Congress use this reauthorization to deepen the focus on professional development in technology at both the pre-service and in-service levels. While it is important to continue to train classroom teachers in the integration of technology into their lesson plans and Intel will continue to do so, we cannot achieve the goal of full technology literacy in this country until we begin to graduate new teachers who bring these skills to their first classroom. Right now, there is a critical debate going on in the education community about how to transform schools of education for the new century. We should use this reauthorization as an opportunity to steer that debate in the right direction.

Finally, we ask that you stay the course on math and science education. Federal support for an increased emphasis on math and science in professional development and in the classroom should become more of a priority. We are not graduating students with core competencies in these areas and sending far too few students on to math and science careers. We recommend that at a minimum teachers teaching these subjects should be able to demonstrate competency in these subject areas. Our students deserve at least that much.

Intel believes in the power of the new economy to build a stronger country and a more empowered citizenry. But we must make sure that everyone is prepared to participate in its

benefits. We believe education is the first, last and most important tool to that end. Intel is prepared to join with government to make technology literacy a national norm. And we believe the rest of the high tech industry will also do that part. Our future really does depend on it.

Carlene Moore Ellis



Carlene M. Ellis is a Corporate Vice President and 19 year veteran of Intel Corporation. She joined the company in 1980 as Manager of Planing and Control, Corporate Information Systems. In 1983 she was promoted to Director of Sales and Marketing Administration. She became Director of Corporate Information Services in 1985, named a Vice President of Corporate Information Systems in 1987, and promoted to a Corporate Officer two years later. From 1988 to 1990 she was Vice President of Finance and Administration, from 1990 to 1992 Vice President of Human Resources, and in 1993 became Vice President of Information Technology. In February of 1999, Carlene was selected to lead the Education initiative for Intel as the Director and Vice President of Education.

Carlene Ellis received her Bachelor of Science degree in Mathematics from the University of Georgia in 1969. She has completed postgraduate work in operations research and computer science at the University of Alabama and University of Georgia. Ms. Ellis worked after graduation as an electrical engineer with Western Electric, computer programmer with the University of Georgia, and an Information Systems Officer with the City of Jacksonville. She also held several positions with Fairchild Camera and Instrument prior to joining Intel.

Carlene was named in a 1989 Business Month's "Corporate Women on the Move", article and was featured in a 1990 Fortune magazine article "On the Rise". She was named to the CIO 100 in 1994, 1996, and 1997. The San Francisco Chronicle named her one of "The Bay Area's Most Powerful Corporate Women" in 1995. She is a Director of Merix Corporation, an American Leadership Forum Class II Fellow, an alumnus of Delta Gamma and board member of the American Leadership Forum, the Sacramento Ballet, and U.C. Davis Advisory Board for the Graduate School of Management and the School of Engineering and on various non-profit boards.

She has two children, Stephanie and Jason and resides in El Dorado Hills, CA.

Committee on Education and the Workforce

Witness Disclosure Requirement – "Truth in Testimony"
Required by House Rule XI. Clause 2(g)

Your Name: CARLENE MOORE ELLIS		
1. Are you testifying on behalf of a Federal. State. or Local Governmental entity?	Yes	No X
2. Are you testifying on behalf of an entity other than a Government entity?	Yes X	No
3. Please list any federal grants or contracts (including subgrants or subcontracts) which you have received since October 1. 1996: NONE		
4. Other than yourself. please list what entity or entities you are representing: INTEL CORP.		
5. If your answer to question number 2 is yes, please list any offices or elected positions held or briefly describe your representational capacity with the entities disclosed in question number 4: DIRECTOR AND VICE PRESIDENT OF EDUCATION.		
6. If your answer to question number 2 is yes. do any of the entities disclosed in question number 4 have parent organizations. subsidiaries, or partnerships to the entities for whom you are not representing?	Yes	No X
7. If the answer to question number 2 is yes. please list any federal grants or contracts (including subgrants or subcontracts) which were received by the entities listed under question 4 since October 1. 1995. including the source and amount of each grant or contract: NONE		

Signature: Carlene Moore Ellis Date: 3/1/2000

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Appendix D-the written statement of Tony Lee, Senior Director, Worldwide Markets, Apple Computer, Inc., Cupertino, California.

Testimony of Tony Lee
Senior Director, Worldwide Markets
Apple

Before the
Subcommittee on Early Childhood, Youth, and Families
U.S. House of Representatives
March 8, 2000

Mr. Chairman and Members of the Subcommittee, I appreciate the opportunity to testify before you today about the impact of educational technology on teaching and learning. In addition, I will also discuss the roles both business and government can play.

My name is Tony Lee and I am Senior Director of Worldwide Markets for Apple – a position that encompasses a wide range of responsibilities including the marketing of Apple's educational products and services to the K-12 and Higher Education communities.

Systemic Change

Mr. Chairman, because of technology, the world today is different and it will continue to change. Society is different. Information is different. Communication is different. Work is different. School is different. And because of this, kids need to be educated differently. According to a report published in 1999 by The CEO Forum, sixty percent of the new jobs created in this century will require skills currently held by only twenty percent of today's workforce. It is critical that our educational system produces kids ready for this different world. Therefore, it is critical that systemic change occurs more rapidly in our educational system. We believe that well trained teachers who can integrate technology into the curriculum will be a catalyst to drive that change.

Apple's Role In Education

By working directly with schools for more than two decades, Apple has experienced first hand the impact technology can have on teaching and learning. In fact, according to International Data Corporation (IDC), Apple continues to be the number one brand in education today. Why does Apple care so much about education? Not only because we believe Apple to have the best technology products and services for schools, but intrinsically because Apple cares about teaching and learning. Our products and services are designed to enable students to focus on learning, and teachers to focus on teaching, rather than asking students and teachers to spend much of their precious time learning to use technology.

As you will see, what we have learned through research and experience is that although access to technology is critical, access alone is not enough. As a result, we firmly believe that the Federal government must also focus its attention and resources on technology integration and ongoing professional development for teachers.

Technology Access

Let's begin by addressing technology access. Access to technology in schools has improved dramatically in recent years. Last month the U.S. Department of Education released statistics indicating that the number of schools connected to the Internet has increased from 35% in 1994 to 95% in 1999. Those statistics also show that the number of individual classrooms connected to the Internet has increased from 3% in 1994 to 51% in 1998 (a number of additional studies indicate for 1999 the figure is near 60%).

Equally important, the student to computer ratio has been reported to be better than 6-to-1 nationwide in 1999, improving significantly from a more than 15-to-1 ratio earlier in the decade. Significant progress is obviously being made, but remember we are still a long way from the promise of a one-to-one computer-to-student ratio. Imagine your office environment if there were only one computer to every six people. This was the environment in an average school in 1999.

Technology Integration

However, access to technology alone does not enhance a student's ability to learn, or improve a teacher's ability to teach, without proper integration into the curriculum. Even with the dramatic increases in technology access over the past decade, only 20% of teachers are comfortable integrating technology into classroom instruction (Source: National Center for Educational Statistics, 1999). Thus, even achieving a one-to-one computer ratio would be meaningless if our teachers can't use the technology or fully integrate it into the curriculum.

Apple Classrooms of Tomorrow

More than a decade ago, Apple initiated a landmark multi-year project entitled Apple Classrooms of Tomorrow (ACOT). By collaborating with public schools, universities, and government agencies, we studied how the use of technology by teachers and students might impact teaching and learning. ACOT's research demonstrated that the introduction of technology into classrooms can significantly increase the potential for learning, especially when it is used to support collaboration, information access, and the

expression and representation of students' thoughts and ideas. (Additional information about Apple's education research and programs is available under the Education section of the Apple web site, located at www.apple.com/education).

Through ongoing research, we have learned that for technology to make an impact on student achievement it must be utilized as a tool to support thinking and for effective communication and collaboration. These are the very skills that tomorrow's workplace will demand of its employees.

In addition, Apple learned through its ACOT research that staff development is a critical component for the effective use of technology. The success of technology in America's classrooms depends upon the skills of the teacher and the support of school administrators.

Professional Development

To truly be able to integrate technology into the curriculum, teachers must be given the time and the opportunity for professional development on an ongoing basis. If this happens, we will witness systemic change in and out of the classroom. Teachers will be more comfortable incorporating technological skills necessary to prepare students for the workplace of tomorrow. Here again, Apple is in the forefront of developing professional development programs.

Apple offers both online and leader-led teacher training through the Apple Learning Professional Development program which consists of workshops, consulting services,

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and planning products designed to foster change in an educator's thinking. Apple has also developed a dynamic online learning community called Apple Learning Interchange (ALI), where over 30,000 educators, share, learn, and communicate. For example, suppose that a teacher is preparing a lesson plan around NASA's exploration of Mars for fifth graders. The teacher would go to ALI on Apple's website and simply enter his/her subject criteria and grade level into the ALI search engine. In a matter of seconds, an entire list of suggested teaching tools, lesson plans, and appropriate websites would be offered for consideration in lesson planning. In addition, the teacher would become connected directly to a group of teachers who are interested in teaching similar subjects. In essence, ALI provides individual teachers with an entire community of like-minded educators nationwide who share ideas and best practices on teaching with technology, who collaborate on education projects, as well as who explore new and different uses for technology in the classroom. In addition, this content is correlated to state and national standards.

Technology Integration Solutions

Apple continues to take a leadership role in developing educational solutions necessary to help teachers integrate new technologies into their classrooms.

For example, last week at the Florida Education Technology Conference (FETC) Apple introduced the Apple Learning Series - an integrated suite of software applications and curriculum content for K-12, including online student projects and staff development. These tools are designed for educators and were developed to meet state and federally mandated education standards.

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Apple's incredibly popular iMac computer gives students the perfect technology in the classroom to allow them to focus on learning.

We also recognize that in today's world, learning happens everywhere; not just in within the confines of a classroom. Apple has sought to respond to this need by developing new technologies that will accommodate the mobile learner. Apple's iBook embodies this philosophic change by delivering powerful technology in an innovative portable design. Extremely rugged and capable of more than six hours use without a recharge, the iBook is quickly becoming the preferred standard for mobile learning.

In addition, Apple's AirPort wireless solution, for both iMacs and iBooks, delivers advantages for both educators and learners. A teacher can effortlessly reconfigure a classroom between lessons without having to disconnect and reconnect all the computers. Students have the ability to be connected to each other and to learning resources in diverse environments, leading to effective collaboration on projects.

Apple has also realized that developing tools to prepare students with 21st century workforce skills are critical. The need for digital media skills is growing every day, as evidenced by the growth of the Internet. We also live in a highly visually oriented world, where digital media is the preferred means of communication of our youth. To support this new requirement for teaching and learning, Apple created Desktop Movies. With this technology, students can easily express themselves by creating Desktop Movies that communicate what they've learned in a richer, more compelling way. Desktop

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Movies can also help students express their knowledge of a concept in a way that can be shared with other students in the classroom, or with communities around the globe. Teachers are successfully using Desktop Movies to reenergize themselves and their classrooms. By giving students the opportunity to work with this technology, students are more motivated and more successful in school. Consequently, accountability becomes much less of a concern and teachers can truly focus on teaching and learning in their classrooms. In fact, teachers are using this technology to visually record how they are being effective in the school environment and how their students are developing. Using Desktop Movies, parents can then see the progression of student work over time and teachers can use it as a valuable assessment tool to showcase student achievement.

Additionally, Apple has developed of a number of Internet tools for teachers, students and their parents designed to enhance the educational experience in a meaningful and secure way. We call these Apple iTools. They allow students to collaborate and share over the Internet. One unique iTool, called KidSafe has received significant praise from educational administrators, teachers and parents. This Internet tool protects our children from inappropriate content by allowing a child access only to pre-screened educator approved sites. Unlike filtering software where a computer program attempts to anticipate the users' queries, Kidsafe is based on educationally sound Web sites that have been pre-approved by educators.

Clearly, Apple has designed innovative technology that prepares students to be knowledge workers for the 21st Century. Apple's technologies continue to make a

difference in how teachers teach and students learn. At the same time, we recognize that no amount of private sector engagement can replace direct government involvement in supporting technology integration and professional development at the state, local, and at the Federal level.

Focus at the Federal Level

Mr. Chairman, we were invited here today to provide insight into Apple's extensive history and experience integrating technology into the curriculum. We were also invited to express our opinions on the role of the Federal government in integrating technology in education.

Frankly, from a technology integration perspective, the Federal government's role is crucial. For although the Federal government only accounts for approximately 7% of all public dollars spent on education, it accounts for 25-30% of the technology dollars spent on education (these figures do not even include the school infrastructure program currently funded by the E-rate program).

So, without question, Apple supports strong technology provisions as an integral part of the reauthorization of the Elementary and Secondary Education Act (ESEA). At the same time however, we believe that the Federal government must focus those educational resources with respect to technology in those two areas where Apple's research and experience has proven our school's are in the most need – technology integration and professional development. It is in these two critical areas that we believe the Federal government's direct involvement and support can help to best

leverage the considerable amount of private resources companies, like Apple, have expended.

In addition, while we support the notion of creating flexibility for states seeking to more effectivaly utilize the various ESEA programs to meet their unique needs, we would strongly urge the Congress to maintain a specific technology program focus by ensuring that technology allocations established under the Act are used for technology purposes. Finally, once the Act is reauthorized, we would also urge the Congress to continue to support full technology funding throughout the appropriations process.

In closing, let me state that Apple's goal is to be the leader in providing simple, powerful, quality information products and solutions for people who learn, create, and communicate, particularly students and teachers. Please be assured that Apple remains committed to working together with the Congress and the Administration to better leverage public funding with private capital in finding ways of integrating technology into education as a means of better helping our students learn and our teachers teach.

Thank you again for the opportunity to appear before you today. I will be happy to answer any questions.

Note: For more information on Apple's education products, services, and programs, please visit the extensive education section of our web site at www.apple.com/education.

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Tony Lee

APPLE Nov 1989 - Present

SR DIRECTOR, WORLDWIDE MARKETS Nov 1999 – Present
Responsible for Education, Creative Professional and Consumer solutions marketing.

DIRECTOR, WORLDWIDE DEVELOPER RELATIONS Mar 1998 – Oct 1999
Responsible for business relationships between Apple and it's Education, Consumer, and Small Business software developers.

DIRECTOR, BUSINESS DEVELOPMENT, NSG May 1997 - Feb 1998
Responsible for business development and licensing for Newton Systems Group and Newton, Inc.

SR MGR, BUSINESS DEVELOPMENT, NSG Feb 1996 - Apr 1997
Responsible for licensing technology for Newton Systems Group.

BUSINESS DEVELOPMENT MGR, VERSIT Apr 1995 - Jan 1996
Responsible for managing the Versit Marketing, Technical and Business teams from the member organizations (Apple, AT&T, Siemens Rolm and IBM).

EUROPEAN MGR BUSINESS DEVELOPMENT, C&C Oct 1994 - Mar 1995
Developed relationships between key European Telecom industry partners and Apple.

EUROPEAN MGR BUSINESS DEVELOPMENT, PIE Jan 1993 - Sep 1994
Built relationships with key European Telecom industry for Apple's Personal Interactive Electronics Division.

UK CORPORATE BUSINESS DEVELOPMENT MGR Nov 1990 - Dec 1992
Managed the relationship between Apple UK and a number of corporate accounts.

UK CORPORATE CONSULTANT Nov 1989 - Oct 1990
Consulted on a number of corporate opportunities within Large Accounts and Government Division of Apple UK.

SALES MGR, ALBION COMPUTERS, LTD, UK Feb 1987 – Oct 1989

SNR SCIENTIST, PLESSEY RESEARCH LTD, UK Oct 1982 - Jan 1987

EDUCATION: BA Physics (1982), Oxford University, UK

Committee on Education and the Workforce

Witness Disclosure Requirement – "Truth in Testimony"
Required by House Rule XI, Clause 2(g)

Your Name: Tony Lee, Snr. Director, Worldwide markets Apple Computer, Inc.		
1. Are you testifying on behalf of a Federal, State, or Local Governmental entity?	Yes	No X
2. Are you testifying on behalf of an entity other than a Government entity?	Yes X	No
3. Please list any federal grants or contracts (including subgrants or subcontracts) which you have received since October 1, 1996: No, I have not received any federal grants or contracts.		
4. Other than yourself, please list what entity or entities you are representing: I am representing Apple Computer, Inc.		
5. If your answer to question number 2 is yes, please list any offices or elected positions held or briefly describe your representational capacity with the entities disclosed in question number 4: I hold no elected positions.		
6. If your answer to question number 2 is yes, do any of the entities disclosed in question number 4 have parent organizations, subsidiaries, or partnerships to the entities for whom you are not representing?	Yes	No X
7. If the answer to question number 2 is yes, please list any federal grants or contracts (including subgrants or subcontracts) which were received by the entities listed under question 4 since October 1, 1995, including the source and amount of each grant or contract: Apple Computer, Inc. has the following direct contracts with the federal government: US Postal service, DISA, military sealift command, GSA, JCS, Bureau of Land Management, TVA, US Air Force, CIA, VA and US Senate. In addition, Apple uses the following resources: GTSI, Microwarehouse, GMRI, GSmicro, and Pinacore who are on the GSA schedule. Although Apple did not receive any education		

Signature: _____ Date: 3/6/00

federal grants directly, we were named as consortium partners in Department of Education's Preparing Tomorrow's Teachers to use Technology (PTTT) grants.

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Appendix E-the written Statement of Jason Bertsch, Deputy Director Of Policy, Empower America, Washington, D.C.

Testimony of Jason Bertsch, Empower America
Sub-Committee on Early Childhood, Youth, and Families
March 8, 2000

Thank you for inviting Empower America to testify today. Technology and education, and the deepening relationship between the two, is one of our organization's primary interests. Just as computers and the Internet have fundamentally reshaped the way we do business, they will also soon reshape education – in universities; in primary and elementary schools; even in preschools. John Chambers, the CEO of Cisco Systems, recently said, "Education over the Internet is going to be so big it is going to make e-mail usage look like a rounding error." Empower America agrees. Technology will, in fact, revolutionize American education.

Today I want to address two particular questions:

- What's wrong with Title III? and,
- How can it be improved?

Title III

As you know, Title III is a relatively new part of the Elementary and Secondary Education Act (ESEA). Its two biggest programs, the Technology Literacy Challenge Fund and Local Innovation Challenge Grants, were first authorized in 1995. Since that time, the federal government has dramatically increased its spending on technology and education programs. In fiscal year 2000, it will spend $768.7 million on Title III. An even larger investment has been made through the federal e-rate program, which will

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push well over $2 billion dollars during 2000 into wiring our public schools for the Internet. State and local authorities will spend even more on this effort.

These investments are partly – perhaps largely -- responsible for the rapid growth of computers and Internet connections in American schools. Of the $6.7 billion dollars that was spent last year on technology and education in the nation's schools, about half came from the federal government.[1] Over 70 percent of our public schools now receive money for technology and education from state or federal sources.

In 1994, only 35 percent of public schools had Internet access; by 1999, 95 percent did. In 1994, only 3 percent of public school classrooms had Internet access; 63 percent did in 1999 (although robust, high-speed connections are still scarce). The ratio of students to computers dropped 25 percent between 1998 and 1999, from 12 to 9 students per computer. All this, obviously, is noteworthy.

But it is not cause for celebration. Why? Because the national investment in technology is not yet producing consistent, real-world results -- neither in teacher preparation, nor in student achievement. A recent report by Gary Chapman, the director of the 21st Century Project at the LBJ School of Public Affairs, found that "the vast majority of U.S. K-12 teachers are novice or even completely inexperienced [Internet and computer] users." According to another recent survey by the National Center for Education Statistics, only

[1] The growth in expenditure by U.S. school districts between 1997-98 and 1998-99 is the highest percentage increase since Quality Education Data began tracking educational technology budgets a decade ago. According to the data, the largest expenditures in districts were for hardware, at 46 percent, followed

20 percent of American teachers feel prepared to use new computer applications and know how to integrate them into their classrooms. Piles of anecdotal evidence confirms these studies.

In Texas, for example, roughly 90 percent of teachers say they use their classroom computers to surf the Internet and 81 percent to use e-mail. Less than half the teachers, however, use computers actually to download information and even fewer use them for collaborative learning projects.[2] A survey by the Educational Testing Service last year found that only one in five teachers knew of lists of recommended software published by districts or states, and just one in ten had found software that was tied to academic standards issued by districts and states.[3]

As far as student achievement goes, the technology is not doing much good so far. In some cases, it may be doing harm. SAT scores, both math and verbal, are stagnant during the 1990s and down sharply since 1960. The National Assessment of Educational Progress (NAEP) also shows very little movement. Most disturbing of all, when compared to children from other industrialized nations on math and science tests, American high-school students are at the bottom of the barrel.

This is a shame not only because we're wasting resources but because we now know that technology, when used correctly, makes a positive impact on schools, on teachers, and on children.

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by network spending (LAN/WAN software, wiring/cabling service/support, servers and routers) at 20.8 percent. This leaves less than a third of the money for teacher training and software.

[2] Texas Education Agency Report, cited in the *Houston Chronicle*, November 29, 1999, A21.

When considering Title III reauthorization, then, the truly critical issue is less one of inequity than of effectiveness. Do teachers know how to utilize, or even operate, their high-tech tools? Who is actually teaching technology to whom, teachers to students or students to teachers (this might be called the "Digital Generational Divide")? Are kids – from whatever background – actually learning more in this new high-tech environment? These questions, in Empower America's view, should guide your discussions when it comes to Title III funding.

Empower America has two basic recommendations that, in our view, will make Title III more efficient and more effective (more thorough documents outlining and explaining these recommendations are attached):

- First, we propose the consolidation of Local Innovation Challenge Grants, the Educational Technology National Activities, the Regional Technology in Education Consortia, Star Schools, Ready to Learn Television, and the Telecommunications Demonstration Project into one competitive grant program. This competitive grant program should favor applicants that propose ways to combine high standards in teaching and technology and that focus on practical ways of integrating technology into the classroom.

[2] Educational Testing Service study, cited in the *New York Times*, "Though School Computers Gain, Teachers Can Remain Befuddled," September 29, 1999, B9.

In addition, a substantial portion of this consolidation (at least five percent) should be set aside for rigorous study of the grants; the lessons learned from the study should be collected and published in a "Best Practices" guide, available on the web.[4]

- Second, with the $425 million dollar Technology Challenge Fund, Congress should aim to promote innovation and encourage states to focus the money on areas that are under-served. States should be encouraged to use the Challenge Fund money in coordination with the competitive grant winners to make sure that we are using our computers intelligently. Moreover, the Congress should require states that receive funds under the Challenge Fund to show results – in terms of parental satisfaction, as well as closing gaps between high and low poverty schools.

Empower America believes that the federal government's role should be limited, focused, and vigorous -- not scattershot. It should seek to answer specific shortcomings in cities and states. In addition, it should seek to provide schools with examples of intelligent ways to implement technology. Better, more productive use of technology, not just more, should be the federal government's goal.

That said, I think it is important to put things in perspective. During the next several years, the federal government will be massively outspent by private financiers. The education industry – the K-12 market, as well as other areas – has recently been attracting the interest of America's leading businessmen and venture capitalists. Since 1994, 38

[4] The Milken Family Foundation and the Milken Exchange has recently conducted several studies of this nature, including "Seven Dimensions for Gauging Progress of Technology in the Schools" and "Survey of

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IPOs and 30 follow-on offerings have been completed in the education industry, raising more than $3 billion in equity. Leading economic indicators suggest those investments will be rapidly increasing.

A recent report from Merrill Lynch declared that "the education industry represents, in our opinion, the final frontier in private participation in public programs.... Compared to other sectors that have been subject to massive reform, such as utilities, telecommunications, transportation, and health care, the education industry represents the largest market opportunity for private sector involvement since health care in the 1970s."

For Congress, this is both good and bad news. It is good news because it means you will have a lot of help preparing kids for the demands of the high-tech 21st century. It is bad news – or maybe it's just daunting news – because it means Congress will have private-sector competitors, partners, and benchmarks. How big a dent on math scores did the Education Department's $50 million make compared to Microsoft's? Who is spending their money on technology training more wisely and effectively – Congress or some young entrepreneur in Silicon Valley? If the latter, why not sunset the government program? These questions, in Empower America's view, are inevitable – and the stuff of which free enterprise and healthy, limited government are made.

Thank you again for inviting Empower America here today. I look forward to your questions.

Technology in the Schools."

EMPOWER AMERICA

ISSUE BRIEFING

Title III of the Elementary and Secondary Education Act

Title III, under the Elementary and Secondary Education Act, is a $683.1 million program, devoted to technology in education. The largest portion of the title (about 62%) is distributed to states through a basic block grant formula, based on the population of disadvantaged students. The rest of its funding consists of a host of competitive grant programs, open to localities, states, universities, and non-profits. The result of this two-part system of distribution is one giant block grant used to supplement existing state plans to implement technology, coupled with a wildly disparate series of grants awarded to individual programs. It is very difficult to imagine a rough sketch of what the money actually buys, and impossible to measure the expenditure's economy, efficiency, or effectiveness.

Title III should be restructured to guide technology's part in American education. It should be designed to answer a need in the American school system, not simply exist to satisfy a nebulous urge for more technology. It should reflect what empirical research has shown to work. Finally, it should ensure that technology is not being implemented mindlessly for its own sake, but as a tool for improving student achievement.

- **Streamline and Ensure Standards-Based Implementation.** The experience of educators and researchers strongly suggests that placing computers in the classroom without an emphasis on implementation into classroom exercises is worse than having no computers at all. An in-depth study by ETS found that school computer use, when it did not involve higher-order thinking or learning games, actually had a negative effect on student achievement; however, when computers were used by teachers who had been trained in computer use and high-order implementation, computers had a positive effect on student achievement. Simply having computers in the classroom is not an end in itself, computers should be a means to improved student achievement. The remainder of Title III programs should provide money to innovational programs in technology education, giving a preference to those programs that seek to integrate technology with high academic standards in the classroom.

  Action:

  - Consolidate Title III competitive grant money ($273.1 million) into a single 'High Standards in Technology' fund. The Department of Education should continue to disseminate this grant money. It should make this money available to all states, localities, non-profit or business entities that aim to integrate technology and high standards.
  - Preference applications for programs that integrate technology with state and local academic standards.

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- Demand that entities accepting competitive grants under the 'High Standards in Technology' program track the achievement of students in their programs, and require that they set goals in terms of academic achievement.
- The Department of Education should highlight the performance of successful programs, giving special weight to increased academic achievement as measured on standardized tests, through the publication of a 'Best Practices' guide. The organization and research for this guide should be completed under the Department's Office of Education Research (OERI) or a research body outside the Department of Education altogether. It should be disseminated to all programs receiving grants under Title III, both competitive and categorical. It should be publicized within the education community, and available to all interested on the Internet.

➢ **Continue Closing the Access Gap.** Change the focus of Title III to technology for the disadvantaged. There is no reason for the federal government to be involved in something that is rapidly proceeding without their prodding. All evidence suggests that computers are flooding most of the nation's classrooms, the sole exception being the classrooms of the poor. The ratio of students per computer has declined from 125 per computer in 1984 to 10 students per computer in 1996; however, as the percentage of Title I and minority students increase in a school, so does the computer to student ratio. Schools with less than 25 percent minority students had computer to student ratio of slightly less than 10 to 1; schools with 90 percent or more of minority students have a ratio of 17.4 to 1. The Title III federal money should be channeled to address this specific shortcoming in the implementation in technology.

Action:

- Change the Technology Literacy Challenge Fund to the 'Technology for All' Challenge Fund and redirect it at high-poverty school districts. In order to focus this program at the schools where the problem exists, high-poverty districts should be defined as districts with 50% or more Title I students. The federal government should continue to distribute this money to the states, but attach a 'Dollars to the Classroom' provision, requiring the states to send 95% to their poorest school districts. The distribution between states should be divided proportionate to the number of Title I students in a particular state.
- In return for federal funds, require states to show significant progress towards narrowing the divide in technological access, as defined by the computer to student ratio, and the percentage of classrooms with Internet connections. Information about the number and sophistication of technology in schools has already been collected in recent years by the Department of Education's NCES. Efforts to assess the success of states at aiding needy schools should be coordinated with these monitoring efforts.
- In state applications for aid, require states to consider how to use their federal money in coordination with competitive grant winners in their state. The two primary programs of Title III should compliment one another, not overlap.

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ISSUE BRIEFING

Title III – Technology in Education

PROGRAM	FY98	FY 99	FY 2000
Technology Literacy Challenge Fund	425	425	425
Local Innovation Challenge Grants	106	115.1	148.7
Educational Technology National Activities:	10	142	109.5
Teacher Training in Technology	0	75	75
Community-Based Technology	10	65	32.5
Technology Leadership Activities		2	2
Middle School Teacher Training		0	0
Software Development Initiative			0
Regional Technology in Education Consortia	10	10	10
Star Schools Program	34	45	51
Ready to Learn Television	7	11	16
Telecommunications Demonstration Project for Mathematics	2	5	8.5
TOTAL	594	753.1	768.1

Begun in 1996, Title III is a relatively new addition to the Elementary and Secondary Education Act. Its biggest programs, the Technology Literacy Challenge Fund and Local Innovation Challenge Grants, were first authorized in 1995 in response to a perceived need in our nation's schools. Since that time, the federal government, along with states across the country, has invested huge sums of money into our school's technological infrastructure. The results of this investment can be seen in the rapid growth of computers into U.S. schools and classrooms. When this progress is combined with the enormous investment of the 'e-rate' (slightly less than $2 billion in 1998, $2.5 billion in 1999), the U.S. is moving quickly to a fully wired school system.

Gary Chapman writes, "Right now, the United States appears to be on a trajectory upon which we can expect that acces to technology and the Internet will soon be more or less ubiquitous, within ten years, and we can also expect that most students will have the basic skills required to use computers and the Internet." Once American classrooms will be completely wired in the next few years, the question then becomes how the technology is integrated into the curriculum.

What does Title III do? Title III funds a variety of programs designed to aid the introduction of technology into the classroom, from the purchase of hardware to the professional development of teachers. Its largest program, the Technology Literacy Challenge Fund is a formula grant to states, targeted somewhat at low-income districts. The targeting of this fund has been fairly successful, as the 'Digital Divide' narrowed substantially in the last year. (See chart below). Other programs within Title III, such as the Local Innovation Challenge Grant, seeks to prod the development of innovative

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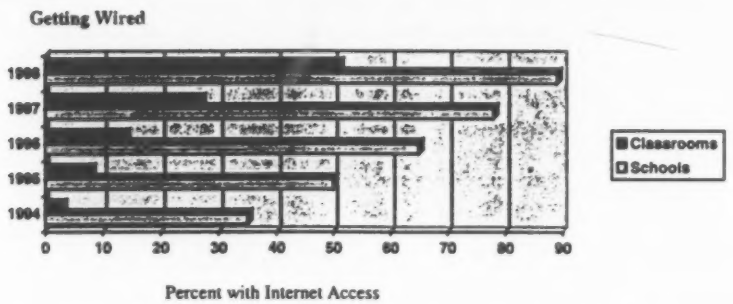
programs by awarding competitive grants. Still other programs go to fund community technology centers (Community Based Technology), or technical professional development programs (Teacher Training).

Is Title III working? The evidence seems to indicate that Title III has done what it set out to do – provide hardware and Internet wiring for classrooms across the country. Yet even this success illustrates the difficulty of orchestrating federal policy from Washington. While the country made leaps and bounds in one area, the advance did not correspond to the needs of the nation's schools. The evidence on this is clear: Computers too often sit in classrooms unused, teachers have received little or no training, and, when used, the technology is rarely coordinated with other learning activities in the classroom. This is a direct product of a government policy that pursued one symbolic goal ("putting a computer in every classroom") at the expense of all other – making sure that teachers could use them, for instance.

The following are the facts that illustrate both these points. The U.S. has come a long way in the past two or three years in terms of technological capital in the classroom. But, in its rush to have so many computers, its implementation has been half-baked at best. Thus far, the product of an enormous investment in technology in the classroom has been almost negligible due to a failure to provide the technology in a way that schools could put it to use effectively.

THE FACTS

There has been rapid growth for Internet access in the classroom. Virtually every school in the U.S. has computer hardware. Between 1994 and 1998, the percent of schools with Internet access rose from 35% to 89%. Between 1997 and 1998, the number of instructional rooms with Internet access almost doubled from 27% to 51%. A similar increase is expected in 1999 and 2000 when huge amounts of funds from the e-rate reach the districts.



The much-publicized digital divide of 1997 narrowed considerably in 1998. As shown on the graph below, the digital divide became a small gap as high poverty, and high minority enrollment districts made huge bounds in technological readiness. Schools with

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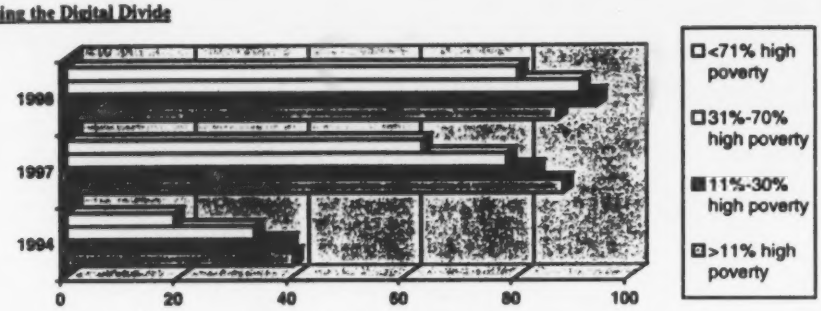
50% minorities or more increased Internet access in their schools from 63% to 82%, and in their classrooms from 13% to 37%.

Closing the Digital Divide



Percent of Schools with Internet access

Technology Facts

- As of 1997, three out of every four U.S. public school classrooms had at least one computer designated for instructional use.
- In 1998, there were 5.7 students for every computer in schools. The number of U.S. students for every instructional, multimedia computer dropped from 21 in 1997 to 13 in 1998.
- In 1997, 40 percent of teachers reported having had no formal training in using the Internet.
- Nearly four in 10 teachers say their students don't use classroom computers at all during a typical week.
- While almost all teachers have access to a computer at school, only slightly more than half--53 percent--use software to enhance instruction in their classrooms, and 61 percent use the Web for this purpose.
- Over half (51%) are connected to the Internet, according to the U.S. Department of Education, up from 3% in 1994.
- The percentage of districts formally keeping track of technology access, use, and training varies greatly from state to state. Districts were more apt to keep track of the presence and location of school technology than to monitor how teachers and students use it.
- Thirty-one states require districts to submit technology plans to receive state technology funds.

Sources:

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Chapman, Gary. "Federal Support for Technology in K-12 Education." Brookings Institution Working Paper. May 6, 1999.

Rowand, Cossandra. "Internet Access in Public Schools and Classrooms: 1994-98." *Education Statistics Quarterly*, Volume 1, Issue 2, Summer 1999.

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Jason W. A. Bertsch

Jason W. A. Bertsch is deputy director of policy at Empower America, where he supervises research, publication, and lobbying efforts in the areas of education reform and high tech issues. He is also a senior advisor to William J. Bennett, former Secretary of Education, Drug Czar, and author of *The Book of Virtues* and *The Educated Child*.

Prior to joining Empower America in 1997, Mr. Bertsch was managing editor of *The Public Interest* which, according to *The Economist*, is "the most politically interesting quarterly in the English-speaking world." During his tenure as managing editor, Mr. Bertsch worked with writers like Charles Krauthammer, George Will, Senator Daniel Patrick Moynihan, Chester Finn, Paul Peterson, and Diane Ravitch and oversaw the publication of several groundbreaking articles on school choice, curricula composition, charter and religious schools, urban educational decay, and computers in the classroom.

Before working at *The Public Interest*, Mr. Bertsch worked for former United States Senator Sam Nunn and *Congressional Quarterly, Inc.*

He received his bachelor's degree from Davidson College in North Carolina, where he graduated Phi Beta Kappa. He then received a master's degree in political philosophy from the University of Toronto.

Mr. Bertsch's articles on higher education and other subjects have appeared in *The Public Interest*, the *American Enterprise* magazine, *City Journal*, *Policy Review*, *Congressional Quarterly*, *National Review*, and elsewhere.

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Committee on Education and the Workforce

Witness Disclosure Requirement – "Truth in Testimony"
Required by House Rule XI. Clause 2(g)

Your Name: JASON BERTSCH		
1. Will you be representing a federal, State, or local government entity? (If the answer is yes please contact the Committee).	Yes	No ✓
2. Please list any federal grants or contracts (including subgrants or subcontracts) which you have received since October 1, 1997: N/A		
3. Will you be representing an entity other than a Government entity?	Yes ✓	No
4. Other than yourself, please list what entity or entities you will be representing: Empower America		
5. Please list any offices or elected positions held or briefly describe your representational capacity with each of the entities you listed in response to question 4: Deputy Director of Policy		
6. Please list any federal grants or contracts (including subgrants or subcontracts) received by the entities you listed in response to question 4 since October 1, 1997, including the source and amount of each grant or contract: —		
7. Are there parent organizations, subsidiaries, or partnerships to the entities you disclosed in response to question number 4 that you will not be representing?	Yes	No ✓

Signature: J. B Date: 3-6-00

Please attach this sheet to your written testimony.

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PERSONAL INFORMATION: Please provide the committee with a copy of your resume (or a curriculum vitae) or just answer the following questions:

a. Please list any employment, occupation, or work related experiences, and education or training which relate to your qualifications to testify on or knowledge of the subject matter of the hearing:

See bio

b. Please provide any other information you wish to convey to the Committee which might aid the members of the Committee to understand better the context of your testimony:

See bio

Please attach to your written testimony.

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Appendix F-the written statement of David H. Winston, Senior Vice President, Fabrizio, Mclaughlin & Associate, Alexandria, Virginia.

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NATIONAL EDUCATION ASSOCIATION

STATEMENT OF
JEFFERY CHIN

ON BEHALF OF
THE NATIONAL EDUCATION ASSOCIATION

SUBMITTED TO THE
COMMITTEE ON EDUCATION AND THE WORKFORCE
SUBCOMMITTEE ON EARLY CHILDHOOD, YOUTH, AND FAMILIES

U.S. HOUSE OF REPRESENTATIVES

ON

EDUCATION TECHNOLOGY

MARCH 8, 2000

(85)

Chairman Castle and Members of the Subcommittee:

Thank you for the opportunity to speak with you today about the critical importance of technology in our nation's classrooms. My name is Jeffery Chin. I have been a teacher for 19 years, including 18 years as an elementary school teacher. I currently teach computer literacy at the Elliott Alternative Education Center in Modesto, California, an alternative high school offering students who have had attendance or discipline problems a more flexible approach that meets their unique needs.

I have spent much of my career as an educator working to integrate technology into my own classroom and into the classrooms of my colleagues. I began when the use of technology in the classroom was a relatively new phenomenon and have witnessed the incredible surge in the availability of a wide range of education technologies. I have seen how technology has enhanced the educational experience for students, introducing them to new ideas and spurring their creativity and enthusiasm in new and different ways.

I have also seen the growing enthusiasm on the part of teachers for the use of technology in the classroom. I spent 13 years as a technology trainer for my school district, training teachers in their classrooms and in the district computer lab. I have seen teachers embrace technology as an exciting tool and recognize the importance of integrating technology into their daily lessons.

The Importance of Educational Technology

Educational technology is a crucial element of a quality education. Technology in the classroom both enhances the educational experience and prepares students for employment in an economy growing increasingly dependent on technology. In the classroom, students who have daily

access to cutting-edge technology perform better academically. Studies have found students who use technology in the classroom show more enthusiasm, have higher attendance rates, develop better writing skills, and display a greater capacity to communicate effectively about complex problems. These studies confirm what I have seen firsthand in my classroom and in the classrooms of my colleagues. Educational technology helps bring an excitement to the classroom, complementing our work by allowing students to see hands-on, practical applications for math, science, and the broad range of curriculum topics.

Use of educational technology also reaches beyond the classroom, to ensure that students are ready to compete in the global economy. Today's students will face a job market in which most, if not all, employment opportunities will require at least a basic technological competence. Computer literacy will often be a determining factor in employability for a wide range of jobs, including those outside the traditional technology fields. Even today's fast food jobs require rudimentary computer skills.

Introducing Technology in the Early Grades

Learning technology skills, like other basic skills, should begin in elementary school. All young students should have the opportunity to acquire a foundation of skills and understanding upon which more sophisticated skills can be built. Given the importance of technological skills to students' future success, we should consider this foundation as important as fostering basic reading and math skills in the early grades.

For example, elementary school students in my district now use word processors to create stories and use basic graphics programs to produce illustrations. Students also make new friends and

learn about life in other parts of the country through e-mail pen pals. Digital cameras allow students to provide a glimpse of their world to other students around the globe by posting their pictures on school web pages. The Internet has allowed teachers to take students on virtual field trips to places thousands of miles away without leaving the classroom.

Increasing Access to Technology

Ensuring that all our students have the opportunity to develop the necessary technological skills requires a strong commitment at the federal, state, and local levels. First, we must ensure that every student, in every school, in every community has access to the most up-to-date technology relevant to the curriculum. Supplying computer hardware and software to classrooms, however, will be inadequate absent an investment in professional development and training for educators. Finally, we must ensure that we do not seek to incorporate technology into the classroom without understanding how the technology fits into the existing curriculum.

While we have made remarkable progress in recent years in increasing classroom access to technology, significant gaps remain. Recent studies show that nearly every school has a connection to the Internet. The E-Rate program has certainly been instrumental in increasing access to the Internet across the country.

This does not mean, however, that every classroom has Internet access, or up-to-date hardware and software. The "digital divide" that exists along racial and economic lines continues to impact many schools and students. For example, while 74 percent of classrooms in low-poverty schools are connected to the Internet, only 39 percent of classrooms in high-poverty schools have

Internet access. The lack of access to technology in school and at home translates into a widening gap for minorities and women in technology careers.

Many older schools lack the infrastructure, including electrical wiring and power, to support educational technology or Internet access. A soon-to-be-released NEA study of school modernization needs found that states face more than $53 billion in costs to make schools technology-ready.

Even those classrooms that have access to technology may have obsolete hardware or out-of-date software. In my own school, I see on a daily basis the impact of inadequate technology. I teach one of two computer literacy sessions at the Elliott Center. One class has access to a modern computer lab with the newest computers and Internet access. My class, however, must use 10-year old hardware with obsolete software and no Internet connection. While students in the first class are learning to use the most up-to-date technology and are developing the skills they will need to enter the workforce, my students are using out-of-date hardware and software with little similarity to newer technologies. They will likely have to re-learn technological skills when seeking employment.

For many students, particularly minorities or those from low-income households, school offers the only opportunity to access technology. It is vital, therefore, that we ensure that students not only have access to computers, but that they have access to the newest computers and to software comparable to that which they will encounter in the workforce.

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Professional Development for Teachers

Providing computers, software, and Internet connections is just the first step in ensuring all students access to technology. Quality professional development and ongoing technical assistance for teachers is an essential element of any education technology initiative.

Even in areas where technology is available, software, hardware, and Internet connections often go unused because teachers lack the skills and knowledge necessary to integrate them into their daily classroom activities. Teachers often express frustration that the lack of available training makes it difficult to take full advantage of the wide range of educational technology.

Training is important both to enable teachers to integrate education technology into classroom and to ensure that teachers are prepared to help students master the technological skills so necessary in today's economy. Education technology can be an effective supplement to a teacher's lesson plans across the spectrum of subjects, but only if the teacher feels comfortable with the technology and understands how best to use it as a complement to the lesson.

Yet, while many teachers have had some basic computer instruction, most have not had training in multi-media activities or on-line activities. Clearly, we need a greater commitment to providing teacher technology training. Teachers also need access to ongoing technical assistance, accessible from the classroom, to help answer questions on a daily basis.

Integrating Technology into the Curriculum

Finally, we must ensure that we are providing -- and training teachers to use -- hardware and software that furthers the goals of the curriculum. My colleagues and I are excited about using

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technology to enhance our lessons, but we cannot incorporate technology without understanding how it fits into the curriculum. Technology is an important tool in today's educational environment, but it should supplement, not supplant, the role of the teacher in deciding how best to teach the curriculum. Teachers should play an integral part in choosing which technologies will work best for their students in their schools and classrooms. Maximizing the use of technology in the classroom requires this buy-in from teachers.

Conclusions and Recommendations

Technology is a critical element of a quality education. We must ensure that all students have access to the latest technology and that all teachers receive training that enables an effective integration of technology into the curriculum. We must modernize schools to enable use of the latest technology. We must provide funding for Teacher Technology Training programs and for ongoing technical assistance. In addition, continued funding for the E-Rate program is necessary to ensure that all classrooms have access to the exciting resources and tools available on the Internet. Finally, any programs to increase access to technology in schools must take into consideration the input and expertise of teachers themselves in determining what technologies will work best in their classrooms.

I thank you for the opportunity to speak with you today. I will be happy to answer any questions.

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	Yes	No
...or local government entity? (If the answer is yes please contact the Committee).		X

2. Please list any federal grants or contracts (including subgrants or subcontracts) which you have received since October 1, 1997:

	Yes	No
3. Will you be representing an entity other than a Government entity?	X	

4. Other than yourself, please list what entity or entities you will be representing:

National Education Association

5. Please list any offices or elected positions held or briefly describe your representational capacity with each of the entities you listed in response to question 4:

6. Please list any federal grants or contracts (including subgrants or subcontracts) received by the entities you listed in response to question 4 since October 1, 1997, including the source and amount of each grant or contract:

	Yes	No
7. Are there parent organizations, subsidiaries, or partnerships to the entities you disclosed in response to question number 4 that you will not be representing?		X

Signature: Jeffery Chm Date: 3-7-00

Please attach this sheet to your written testimony.

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PERSONAL INFORMATION: Please provide the committee with a copy of your resume (or a curriculum vitae) or just answer the following questions:

a. Please list any employment, occupation, or work related experiences, and education or training which relate to your qualifications to testify on or knowledge of the subject matter of the hearing:

Jeffery Chin

Jeffery Chin is a second generation Chinese American. His 19-year teaching career includes 18 years as an elementary school teacher. He currently teaches computer literacy to high school students at the Elliott Alternative Education Center in Modesto, California. He has extensive experience as a trainer and mentor helping teachers to integrate technology into classroom activities. Mr. Chin is married to a teacher and has three children. He is active in his local, state, and national associations.

b. Please provide any other information you wish to convey to the Committee which might aid the members of the Committee to understand better the context of your testimony:

Please attach to your written testimony.

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